

Multifunctional Logistics: Comparing Air Force and Army Constructs

**A Monograph
by
Major Anthony T. Dyess
United States Air Force**



**School of Advanced Military Studies
United States Army Command and General Staff College
Fort Leavenworth, Kansas
AY 02-03**

Approved for Public Release; Distribution is Unlimited

SCHOOL OF ADVANCED MILITARY STUDIES

MONOGRAPH APPROVAL

Major Anthony T. Dyess

Title of Monograph: Multifunctional Logistics:
Comparing Air Force and Army Constructs

Approved by:

COL Brian F. Waters, MMAS

Monograph Director

Robert H. Berlin, Ph.D.

Professor and Director
Academic Affairs,
School of Advanced
Military Studies

Philip J. Brookes, Ph.D.

Director, Graduate Degree
Program

Accepted this 24th Day of April 2003

Abstract

MULTIFUNCTIONAL LOGISTICS: COMPARING AIR FORCE AND ARMY CONSTRUCTS by Major Anthony T. Dyess, United States Air Force, 63 pages.

The United States Air Force recently implemented a new logistics construct. This construct restructured logistics officer career fields and organization. The most significant results were the creation of multifunctional logistics officers, a new multifunctional logistics squadron, and the dissolution of logistics groups in favor of pure maintenance groups.

A similar “multifunctional logistics” effort began in the United States Army in the early 1980s. Over the past two decades the Army has learned and improved upon its original concepts. The results are: a multifunctional logistics officer functional area, multifunctional logistics battalions, and a unified logistics organization above battalion-level in the form of the Division Support Command (DISCOM).

This study compares the Air Force and Army logistics constructs in an effort to gain insights that might help improve upon the Air Force’s fledgling multifunctional logistics effort. While logistics means many things to many people, this study focuses primarily on the core logistics functions of transportation, supply, and maintenance.

The comparison is structured using the doctrine, organization, training, and leadership development and education aspects of the joint DOTML-PF framework. The materiel, personnel, and facilities aspects of DOTML-PF are not included.

The study indicates that both services have squadron and battalion constructs that fit their individual warfighting requirements. The comparison, however, showed the overall Army construct to be more in line with historical and doctrinal logistics guidance. First, all Army logistics officers must gain functional area depth within one of the three core logistics branches before broadening into multifunctional logistics. In order to assume the most responsible leadership roles within the Army logistics community, however, Army logistics officers must become multifunctional logisticians. Finally, unity of command of all logistics functions is preserved in the DISCOM structure. This allows true integration of all logistics functions, thereby ensuring optimization of the entire logistics system vice optimization of each part of the system.

The study makes three recommendations for improving the Air Force logistics construct. First, the study recommends reinstituting the logistics groups. This will provide unity of command across the entire logistics enterprise of Air Force wings. Second, logistics officer training needs to be changed. Logistics readiness officers (LROs) should gain depth of experience in one logistics discipline before broadening. Additionally, maintenance officers should be allowed to gain breadth of experience across all logistics disciplines after becoming proficient in maintenance. Finally, the current advanced training plan should ensure that Air Force logisticians from all logistics disciplines have the opportunity to undergo meaningful advanced training programs that provide a genuine appreciation and understanding of the interrelationships of the entire logistics system.

TABLE OF CONTENTS

TABLE OF CONTENTS.....	i
CHAPTER ONE.....	1
BACKGROUND.....	1
PURPOSE.....	2
STRUCTURE.....	2
CHAPTER TWO.....	4
FRAMING DOCUMENTS.....	4
DESCRIPTIVE DOCUMENTS.....	11
ANALYTICAL DOCUMENTS.....	12
SUMMARY.....	16
CHAPTER THREE.....	17
AIR FORCE TACTICAL LOGISTICS ORGANIZATION.....	17
OVERARCHING LOGISTICS CONCEPTS.....	17
MULTIFUNCTIONAL LOGISTICS OFFICERS.....	18
THE NEW AIR FORCE LOGISTICS READINESS SQUADRON.....	20
COMBAT WING ORGANIZATION (CWO).....	25
MAINTENANCE OPERATIONS SQUADRON.....	26
AIRCRAFT MAINTENANCE SQUADRON.....	28
ARMY TACTICAL LOGISTICS ORGANIZATION.....	29
OVERARCHING LOGISTICS CONCEPTS.....	29
MULTIFUNCTIONAL LOGISTICS OFFICERS.....	30
MULTIFUNCTIONAL LOGISTICS UNITS.....	31
CHAPTER FOUR.....	37
DOCTRINE.....	37
ORGANIZATION.....	41
TRAINING.....	45
LEADER DEVELOPMENT AND EDUCATION.....	48
CHAPTER FIVE.....	51
CONCLUSIONS.....	51
RECOMMENDATIONS.....	55
BIBLIOGRAPHY.....	60
 <u>Figure 1: Logistics Readiness Squadron Structure</u>	 21
<u>Figure 2: Distribution Flight Structure</u>	22
<u>Figure 3: Readiness Flight Structure</u>	23
<u>Figure 4: Management and Systems Flight Structure</u>	24
<u>Figure 5: Combat Wing Organization Structure</u>	25
<u>Figure 6: Maintenance Operations Squadron Structure</u>	27
<u>Figure 7: Aircraft Maintenance Squadron Structure</u>	28
<u>Figure 8: Division Support Command Structure</u>	32
<u>Figure 9: Main Support Battalion Structure</u>	33
<u>Figure 10: Forward Support Battalion Structure</u>	35

CHAPTER ONE

“The keynote of logistics is service, and to ensure adequate logistics service, our thinking must be constantly reviewed.”

Major General Thomas H. Chapman, Air Force¹

BACKGROUND

The United States Air Force (Air Force) recently undertook a reorganization of its logistics functions. This reorganization took place in the context of the new Combat Wing Organization (CWO), but the entire change involved restructuring logistics within the wing. This change consolidated all aircraft maintenance functions under one chain of command below the wing commander level. Consolidating aircraft maintenance in this way is nothing new to the Air Force. Maintenance organizations have alternated between centralized and decentralized management throughout the entire history of the Air Force. The revolutionary change came in the management of the other core logistics functions of supply, transportation, and logistics planning. These functions moved from a functional organization structure of separate squadrons and career fields into a multifunctional squadron with officers combined into one career field. The final major change brought about under the new CWO was the disbanding of the Logistics Groups. Like the change in maintenance management, this is not revolutionary. The Air Force has historically separated its logistics functions under different leaders below the wing commander level.

The current Air Force Chief of Staff (CSAF), General John Jumper, got the ball rolling on the reorganization prior to taking his current position. General Jumper's previous assignment was Commander, United States Air Forces in Europe (USAFE). In this role the general recognized a disturbing downward trend in aircraft mission capable rates. With the assistance of his lead logistician, General Jumper began a campaign to change the way the Air Force

organized, trained, and managed its maintenance functions. The campaign began with a briefing entitled “Posturing Aircraft Maintenance for Combat Readiness” given to CSAF General Michael Ryan. General Jumper’s briefing resulted in a CSAF directed comprehensive logistics review. The review lasted two and a half years. The review resulted in the new CWO after General Jumper took over as CSAF.²

PURPOSE

The purpose of this monograph is to compare the current Air Force tactical-level logistics construct to that of the United States Army in order to assist the Air Force in its move to multifunctional logistics. In the late 1980’s, the Army moved from functional logistics units, specifically, supply, transportation, and maintenance battalions, into multifunctional logistics battalions. They kept the enlisted workforce in specialized career fields, but moved their officers into a multifunctional career track called Functional Area 90. The officers still specialized during the early portion of their careers, but were expected to become multifunctional (i.e., understand and be able to lead all logistics functions) as they became more senior.³ This Army restructuring is very similar to Air Force efforts today. Hopefully, the lessons learned by comparing the Army’s concept of multifunctional logistics with the Air Force’s current efforts can provide useful examples for Air Force incorporate into its transition.

STRUCTURE

This monograph has five chapters. Chapter I introduces the topic and lays out the purpose and structure of the paper. Chapter II frames the discussion through a definition of terms

¹ *Quotes for the Air Force Logisticians*, (Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001), 21.

² Michael E. Zettler, “Changing Air Force Logistics: Chief’s Logistics Review,” *Air Force Journal of Logistics*, 25, no. 2, (Maxwell Air Force Base, AL: Air Force Logistics Management Agency, 2001), 6.

³ Martin S. Wagner, “Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?” (Fort Leavenworth, KS: School of Advanced Military Studies, 2000), 12.

and a presentation of relative organizational levels and logistics officer management constructs within the Army and Air Force. Chapter II also presents a literature review of logistics and logistics management concepts, definitive documents that explain the Army and Air Force organizations, and prior analysis of logistics organizations and concepts. Chapter III provides the details of logistics organization and officer management within each service. Chapter IV analyzes the facts presented in chapter three by comparing the two logistics constructs in the areas of doctrine, organization, training, and leader development and education. Chapter V completes the monograph with conclusions and recommendations for Air Force logistics improvements and continuing success.

CHAPTER TWO

“If our aircraft, missiles, and weapons are the teeth of our military might, then logistics is the muscle, tendons, and sinews that make the teeth bite down and hold on—logistics is the jawbone! Hear that? The JAWBONE!”

Lieutenant General Leo Marquez, Air Force⁴

Comparing the organizational structures, techniques, and procedures of the United States Air Force and the United States Army requires careful analysis of the different missions and cultures. These are different enough that framing the comparisons carefully is required in order to arrive at valuable conclusions. Framing this comparison required a thorough investigation of many types of literature. Breaking the literature into three broad categories facilitates presenting the findings of this investigation: 1) framing documents, 2) descriptive documents, and 3) analytical documents. Framing documents are those that define terms and management principles. Descriptive documents provide facts. These facts provide the details for understanding the organizations, techniques, and procedures under investigation. The final category, analytical documents, delves into critiques that examine current and proposed systems.

FRAMING DOCUMENTS

Valuable comparisons of disparate systems require carefully defining the systems' commonality. In this study, a good definition of logistics must be the starting point. Many sources speak of logistics without ever defining it, as if its definition is readily understood by all. This is far from the truth. The Air Force Logistics Management Agency produced a concise historical account entitled *The Logistics of War: A Historical Perspective*. This work lays out the dilemma right up front in its preface. It points out that “the word logistics entered the American lexicon little more than a century ago. Since that time, professional soldiers, military historians,

⁴ *Quotes for the Air Force Logistician*, (Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001), 17.

and military theorists have had a great deal of difficulty agreeing on its precise definition.⁵ Kenneth Brown emphasizes this in his National Security Essay, *Strategics: The Logistics-Strategy Link*. Mr. Brown waited until the very end of an essay on logistics to explain that he had “avoided discussing the functions of logistics because logistics is the everything-else art and science; logistics includes hundreds of possible functions since everything needed to support warfare could be included in the list.”⁶ Despite the difficulty acknowledged throughout the professional logistics community, this monograph requires a single definition in order to compare United States Air Force and United States Army logistics.

Many works on business and military logistics provide explanations from which to formulate this type of definition. The business world sees logistics as the entire process of designing, acquiring, producing, delivering, and maintaining a product. Two prestigious professional associations have produced slightly different definitions. Benjamin Blanchard, in his textbook *Logistics Engineering and Management*, provides the Society of Logistics Engineers (SOLE) definition. SOLE defines logistics as “the art of science and management, engineering, and technical activities concerned with requirements, design, and supplying and maintaining resources to support objectives, plans, and operations.”⁷ In *Contemporary Logistics*, the authors note the other professional association, the Council of Logistics Management (CLM), expanded its definition in 1991. CLM “defined logistics as ‘the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements.’”⁸ Between the two texts, Blanchard points out that there are really “two different

⁵ Beth F. Scott, James C. Rainey, and Andrew W. Hunt, eds., *The Logistics of War: A Historical Perspective*, (Maxwell AFB, AL: Air Force Logistics Management Agency, 2000), viii.

⁶ Kenneth N. Brown, *Strategics: The Logistics-Strategy Link*, (Washington, D.C.: National Defense University Press, 1987), 59.

⁷ Benjamin S. Blanchard, *Logistics Engineering and Management*, 4th ed., W.J. Fabrycky and J.H. Mize, eds., (Englewood Cliffs, NJ: Prentice Hall, 1992), 4.

⁸ James C. Johnson and others, *Contemporary Logistics*, 7th ed., (Upper Saddle River, NJ: Prentice Hall, 1999), 5.

areas within the broad spectrum of logistics: the business logistics area of activity, and the sustaining consumer area which is related to military logistics.”⁹ While the United States military certainly is involved in the business logistics area, commonly referred to as wholesale logistics, this monograph will not deal with this area. This leaves only the military logistics of portion of supplying and maintaining resources, commonly referred to as “retail” logistics.

Even within this relatively limited aspect of logistics, neither scholars, nor the military services can agree on what is actually included. The noted military theorist, Baron deJomini, points out in *The Art of War* that if logistics included everything commonly attributed to it, “it would be nothing more nor less than the science of applying all possible military knowledge.”¹⁰ Martin van Creveld, in his seminal work, *Supplying War: Logistics from Wallenstein to Patton*, puts together pieces of quotes from Jomini to arrive at the following definition. Logistics is “‘the practical art of moving armies’ under which he also includes ‘providing for the successive arrival of convoys of supplies’ and ‘establishing and organizing...lines of supplies’.”¹¹ This definition provides a good foundation for understanding retail military logistics today. In 1966, James Huston provided the definition that comes closest to defining military logistics for the purposes of this monograph. He noted that military logistics deals with “the three big M’s of warfare—materiel, movement, and maintenance.”¹² With this definition in mind, we can now examine how the United States military defines logistics. The joint definition, along with those used by the Army and Air Force, provide the definitions that must be tailored to arrive at the monograph area of interest. *Joint Publication 4-0* defines logistics as “the process of planning and executing the projection, movement and sustainment, reconstitution, and redeployment of operating forces in

⁹ Benjamin S. Blanchard, *Logistics Engineering and Management*, 4th ed., W.J. Fabrycky and J.H. Mize, eds., (Englewood Cliffs, NJ: Prentice Hall, 1992), 5.

¹⁰ Baron Antoine Henri de Jomini, *The Art of War*, with introduction by Charles Messenger, (London: Greenhill Books, 1996), 253.

¹¹ Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, (New York, NY: Cambridge University Press, 1977), 1.

¹² James A. Huston, *The Sinews of War: Army Logistics 1775-1953*, Army Historical Series, (Washington, D. C.: Center of Military History United States Army, 1988), viii.

the execution of national security policy. Logistics functions include supply, maintenance, transportation, civil engineering, health services, and other services.”¹³ Both the Army and Air Force alter this definition in their own doctrine.

The Army does not commonly use the term “logistics” to define its logistics functions. It primarily uses the term combat service support (CSS). Its definition of CSS removes the joint function of civil engineering and moves it under the category of combat support (CS). It defines other services as field services, explosive ordnance disposal, human resources support, financial management operations, religious support, legal support, and band support.¹⁴ Thus, the Army definition of logistics, which it uses synonymous with CSS, includes a very broad spectrum of services. Despite the breadth of this definition, Martin Wagner in his monograph, “Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?”, points out that the three primary logistics functions in the Army are quartermaster (i.e., supply), ordnance (i.e., maintenance and munitions), and transportation.¹⁵ These align perfectly with the three M’s of materiel, movement, and maintenance.

The United States Air Force defines logistics more restrictively than either the Department of Defense or the Army. It not only removes civil engineering from the joint definition like the Army, but it also removes medical health services and other services. When the term logistics is used in the Air Force, it refers to the three M’s (plus a slight twist). Air Force logistics includes supply (materiel), transportation (movement), and maintenance. The twist is the inclusion of a uniquely Air Force specialty called logistics plans. While the specialty is

¹³ Department of Defense. *Joint Publication 4-0: Doctrine for Logistics Support of Joint Operations*, (Washington, D.C.: Office of the Chairman Joint Chiefs of Staff, 2000), V.

¹⁴, Department of the Army. *Field Manual 3-0: Operations*, (Washington, D.C.: Headquarters Department of the Army, 2001), 12-4 to 12-5.

¹⁵ Martin S. Wagner, “Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?” (Fort Leavenworth, KS: School of Advanced Military Studies, 2000), 1.

unique, the functions performed by it are not; the Air Force has simply chosen to break out the need to plan and integrate the three primary logistics areas into a career field specialty. The three M's have always been part of Air Force logistics. In 1986, a lieutenant colonel attending the Industrial College of the Armed Forces (ICAF) wrote a paper entitled, "Air Force Logisticians: Generalists or Specialists?" In it, he identified maintenance, supply, transportation, and logistics plans as the core Air Force logistics functions. He pointed out that, while procurement and contracting had been included as logistics career fields at different points in Air Force history, they were not considered so at the time.¹⁶ This has not changed in today's Air Force. Sometimes contracting is considered part of logistics, but it is never considered a core logistics discipline. The ICAF lieutenant colonel mentioned above is now the Air Force Deputy Chief of Staff for Installations and Logistics, Lieutenant General Michael E. Zettler. In 2001, General Zettler wrote his first Air Force Journal of Logistics article concerning the Chief's Logistics review. In it, he identified the same core logistics career fields of maintenance, supply, transportation, and logistics plans that were included in his ICAF paper 15 years earlier.¹⁷

While the literature review above highlights the breadth of logistics, it clarifies the consistency of what the core logistics disciplines involve. Those are the three M's: materiel, movement, and maintenance, or, as they are called today, supply, transportation, and maintenance. This monograph will only evaluate these three core logistics functions within the Army and Air Force tactical units.

It is now necessary to determine the comparable levels of tactical units within the Army and the Air Force. This monograph will compare the lowest tactical level organization with a "field grade" commander. Field grade officers are those in the rank of major and lieutenant

¹⁶ Michael E. Zettler, "Air Force Logisticians: Generalists or Specialists?", Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 7.

¹⁷ Michael E. Zettler, "Changing Air Force Logistics: Chief's Logistics Review," *Air Force Journal of Logistics*, 25, no. 2, (Maxwell Air Force Base, AL: Air Force Logistics Management Agency, 2001).

colonel. In the Army, the battalion is the first echelon authorized a field grade commander. In the Air Force, the equivalent level is the squadron. Therefore, for the purposes of this monograph comparisons will be made at the battalion and squadron level.

The final framing documents lay out the framework used in this paper to evaluate Army and Air Force multifunctional logistics constructs. The Army introduced the joint community to a concept for program evaluation that it called “DTLOMS”. The acronym DTLOMS stands for doctrine, training, leader development, organizations, materiel, and soldiers.¹⁸ The DTLOMS concept was accepted into the joint community as a method for ensuring program integration. However, the joint community changed and added to the original concept. The concept is now coined “DOTMLPF” which stands for “doctrine, organization, training, materiel, leader development and education, personnel, and facilities.”¹⁹ The new DOTMLPF elements are each considered interrelated functional areas of any Department of Defense (DOD) program.

While DOD uses DOTMLPF to ensure that new acquisition programs, organizational changes, and warfighting concepts are integrated throughout the joint team, the framework is very useful for comparing two alternatives for a given enterprise, such as Army and Air Force multifunctional logistics. A complete study of how to integrate any logistics enterprise would include very detailed empirical data analysis. For instance, to determine if one alternative costs more in terms of facility requirements, one would need to do detailed workspace measurements. In the personnel functional area, a study would have to conduct manpower savings analysis to determine if one construct required more or less personnel than the other. The same goes for materiel requirements. Due to the limited scope and depth of this study, no such empirical analysis is possible; therefore, the “M”, “P”, and “F” of DOTMLPF will not be part of the

¹⁸ *TRADOC Pamphlet 71-9: Requirements Determination*, (Fort Monroe, VA: Headquarters United States Army Training and Doctrine Command, 1999)

¹⁹ Department of Defense. *Chairman of the Joint Chiefs of Staff Instruction 3180.01: Joint Requirements Oversight Council (JROC) Programmatic Processes for Joint Experimentation and Joint Resource Change Recommendations*, (Washington, D.C.: Office of the Chairman Joint Chiefs of Staff, 2002), 1.

framework for comparing the different service approaches to multifunctional logistics. Doctrine, organization, training, and leader development and education are the functional areas of DOTMLPF used in Chapter 4 analysis. A basic working definition of the elements used in the analysis is necessary to ensure understanding of the results.

The DOD Dictionary of Military Terms defines doctrine as the fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives.²⁰ In other words, doctrine provides the overarching framework for how things should work. If doctrine is written properly, it facilitates “centralized control and decentralized execution”. If things are not exactly as they were expected to be, subordinate level leaders can make decisions that are unified in purpose and spirit with those of the larger organization.

The DOD Dictionary does not define the term organization, but The American Heritage Dictionary does. Organization, as it is referred to in the DOTMLPF framework, is the “act of organizing.” The result is “a number of persons or groups having specific responsibilities and united for a particular purpose.”²¹ For the purpose of this study, both logistics constructs will be analyzed to determine the benefits and drawbacks associated with each chosen organizational structure.

Training, as it fits into the DOTMLPF framework, is the act of making soldiers and airmen proficient in a particular skill set through “specialized instruction and practice.”²² This study focuses on the training provided to logistics officers of each service. It includes initial and follow-on training.

Leader development and education are not defined in a particular dictionary. They are, instead, a framework for ensuring that a plan is in place to grow current and future leaders to

²⁰ Department of Defense. *Joint Publication 1-02: DOD Dictionary of Military and Associated Terms*, (Washington, D.C.: Chairman of the Joint Chiefs of Staff, 2003), 165.

²¹ *The American Heritage Dictionary: Second College Edition*, (Boston, MA: Houghton Mifflin Company, 1982), 876.

²² *Ibid.*, 1285.

employ a particular doctrine, organization, personnel, and equipment. Education is placed in this category, as opposed to the training category, because the military traditionally thinks of training as teaching people exactly “what to think”, while education is supposed to teach “how to think.” Education does not provide the answers to every eventuality; it enhances the leader’s ability to make decisions in a multitude of unexpected situations.

DESCRIPTIVE DOCUMENTS

The framing documents section defined the functions this monograph will compare and identified the criteria that will be used for the comparison. This section delves into the nuts and bolts of the topic organizations. Specifically, it lays out the organizational structures of the Air Forces Logistics Readiness Squadrons (LRS) and the Army’s Forward Support Battalions (FSB). Additionally, where the organizations do not include the complete range of supply, transportation, and maintenance, the descriptive documents explain how the LRS and FSB interface with the functions outside of their immediate command authority.

The Army’s FSB documentation is fully developed. This is understandable, since they have been using this organizational structure for about the last 15 years. The 63-series field manuals provide a detailed look at tactical logistics support. They identify the organizations involved and expand upon their interfaces and responsibilities. For the FSB, the texts identify its organizational structure down to the company level. They go into detail about how the FSB fits into the logistics structure up and down one level. Other Army publications, such as *Field Manual 4-0: Combat Service Support*, and *Field Manual 3-0: Operations* provide a comprehensive view of Army logistics and how the FSB functions within the Army logistics construct. Finally, a condensed version of the applicable Army field manuals exists in John E. Edwards’ *Combat Service Support Guide*. This guide presents Army logistics organizational structures for the Army of Excellence (AOE), as well as, the new Force XXI divisions. The duty

descriptions that accompany the organizational charts provide a level of detail that will be useful for comparing against the Air Force organizations.

The Air Force recently changed its entire logistics construct. As a result, its documentation is less well-developed than that of the Army. The first functional LRS's stood up in October 2002. The most comprehensive document concerning the LRS is the *Combat Wing Organization Program Action Directive (PAD)*. This document details the organizational structure of the LRS, as well as the other logistics functions with which it must interface. The PAD's shortfall lies in the fact that it is really a programming document. This means that it is primarily aimed at getting the accounting pieces right during the organizational transition. For a complete picture of the tactical logistics changes brought about by the Combat Wing Organization (CWO), one must review articles, briefings, and point papers. The Air Force Chief of Staff (CSAF), General John Jumper, and the Air Force Deputy Chief of Staff for Installations and Logistics (AF/IL), Lieutenant General Michael E. Zettler, have written several good articles and given newspaper interviews to ensure their vision is understood. General Jumper's *CSAF Site Pictures* provide a clear picture of why the change is taking place and the objectives for the CWO. General Zettler's articles in the *Air Force Journal of Logistics* and the *Exceptional Release*, the Air Force Logistics Officers Association's professional journal, provide the details of the reorganization and clarify further the goals set out by General Jumper. The briefings and point papers on the Air Force Installations and Logistics website go into the worker-bee detail of what the reorganized logistics structure looks like. These documents, while not official Air Force doctrine, provide enough detail to gain a valid picture of the new LRS and its role in Air Force tactical logistics.

ANALYTICAL DOCUMENTS

Analytical documents include books, unpublished academic research papers, and journal articles. These documents provide reasoned and thoughtful analysis of logistics and the

organizational structures employed in logistics operations. Examining this past analysis helps new research build on a solid foundation.

Books provide a useful starting point for research. Two texts, *Contemporary Logistics* and *Logistics Engineering and Management*, provide baseline logistics concepts useful in this monograph. *Contemporary Logistics* provides a good discussion about the need for specialists and generalists for those leading logistics organizations. This text, also, provides an in-depth look at the supply and transportation functions and their interaction in the distribution arena. Finally, the last section of the book covers reengineering logistics systems. Specifically, it speaks to the requirements for integration in “not-for profit” agencies (i.e., the United States military).

In *Logistics Engineering and Management*, Blanchard produced a text so applicable to military logistics that it is a primary textbook for the Air Force Institute of Technology’s School of Logistics and Engineering. The “Measures of Logistics” section outline measures for all three logistics areas. These will provide a sound basis for evaluating the organizational constructs in this monograph. The “Logistics Management” section explains different organizational paradigms that may be useful in presenting recommendations.

Books written by especially successful military logisticians present recommendations to those of us that follow for how to emulate their success and avoid their failures. Some prominent military logistics leaders have contributed to this genre of literature. They include: Rear Admiral Henry E. Eccles, Colonel (USA)/Doctor James A. Huston, Colonel (USA) Kenneth N. Brown, General (USA) Carter B. Magruder, Lieutenant General (USA) William G. Pagonis, and Lieutenant General (USA) Jack C. Fuson. This list presents the authors in the order their works were published. Their books are all useful for understanding and evaluating military logistics.

In 1959, Admiral Eccles wrote *Logistics in the National Defense* in which he emphasizes command as the critical element in ensuring logistics supports the warfighter. He provides a great section on how to organize logistics to achieve maximum readiness. In 1987, Colonel Brown’s national security essay, *Strategics: The Logistics-Strategy Link*, maintains that logistics

cannot simply be told what the operational plan is, but must be an integral part of developing that plan. He combines the words strategy and logistics to offer a new word called “strategics.” In 1988, Dr. Huston wrote *The Sinews of War: Army Logistics 1775-1953*. This voluminous historical account of logistics operations in war concludes with a good discussion of principles of logistics and changes due to the “organizational revolution.” In 1991, General Magruder wrote *Recurring Logistic Problems as I Have Observed Them* in which he presents an enlightening account of recurring problems with military logistics. These accounts are from the general’s first hand experience from Operation Torch through the time when the last troops were departing Vietnam. He covers many timely topics in logistics today. An entire chapter covers logistics support of contingency plans (one can read “expeditionary” operations here). Another chapter speaks to career management issues for logistics officers. Finally, he presents ideas on coordination of command and management. In 1992, General Pagonis wrote *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War* in which he provides a contemporary account of logistics in America’s most recent large-scale war. General Pagonis’ final chapter presents lessons in both leadership and logistics. Finally, in 1994, General Fuson took General Magruder’s emphasis on leadership in logistics to a higher level in his book, *Transportation and Logistics: One Man’s Story*.

Two historical accounts of logistics in war also provide good information concerning logistics principles, problems, and organizational theories. The first and most famous is Martin van Creveld’ work entitled *Supplying War*. Van Creveld begins by defining logistics and its origins. He provides a good account of logistics evolution beginning with Gustavus Adolphus’ army in the early 1600’s. It is in the final chapter, however, that vanCreveld presents his most important finding. His research proved that machine-made supplies and not personnel sustainment stocks constitute the bulk of logistics effort in modern militaries. The Air Force Logistics Management Agency produced the other useful historical work. *The Logistics of War: A Historical Perspective* provides a look at a plethora of logistics concepts with historical

examples to back them up. Most importantly, however, this work presents good historical information on Air Force logistics doctrine.

In addition to published books, academic research papers and commercially procured third-party evaluations also provide valuable insights into military logistics. Six research papers, three each for the Army and Air Force logistics systems, provide information useful in comparing and evaluating the two organizational constructs.

Authors Allan R. Cunningham, Carl D. Bird, and Martin S. Wagner present compelling papers on the Army's concept of logistics support. Cunningham, in his Army War College Strategy Research Project, discusses the move from supply-based logistics to distribution-based logistics. This move is the basis for the combining of the supply and transportation functions. Bird's School of Advance Military Studies (SAMS) monograph conducts a thorough investigation of the FSB concept in the Army. This evolution is likely to hold key lessons learned that may prove useful to the Air Force as they begin their journey down a similar road. Wagner's SAMS monograph examines career management of the core logistics officers in the Army. His research examines the specialist versus generalist argument and the training requirements involved in achieving both.

Three Air Force projects shed light on the required integration for successful logistics operations and how the new CWO will work. General Zettler's ICAF paper does a good job exploring the specialist versus generalist argument for logistics officers. He compares Air Force, Army, and Marine Corps approaches in this area. J. Reggie Hall, in his research report while attending the Air Force's Air Command and Staff College, examines the need for integrated logistics in order to achieve the Air Force's expeditionary goals. Hall approaches this from the angle of officer training requirements and the current lack of integration in this area. Finally, RAND's Project Air Force, at the bidding of the CSAF, conducted an evaluation of the changes brought about during the CLR. Their report provides a good history of Air Force logistics organizational structure and highlights the impacts of those changes. Most importantly, however,

the report documents CLR design as opposed to the CWO structure and presents quantifiable results based on the Air Force test cases. This report is currently in draft, but it is expected to be approved and published prior to completion of this monograph.

The final documents examined in this literature review are the reports, briefings, and point papers produced during the CLR and the subsequent test bases around the Air Force. These documents cover the organizational variations, unit difficulties, and logistics considerations about the new CWO. The insights are raw information unfiltered by higher commands, and, as such, provide candid assessments useful to a complete understanding the changes taking place.

SUMMARY

Literature concerning logistics is very useful in framing the comparison of Army and Air Force tactical logistics constructs. No past studies comparing these two constructs were found in the course of this research. This is certainly true of the United States Air Force Logistics Readiness Squadron, as this is the first time in history that such a merger of core logistics functions has occurred in the Air Force. The fact that the Army moved to multifunctional logistics organizations over a decade ago highlights the fact that a “benchmarking” type study might be useful to Air Force reorganization efforts. The logistics principles and concepts proven over time, along with Army efforts to analyze their own reorganization, provide a solid foundation for assessing Air Force efforts and offering suggestions for how to get it right.

CHAPTER THREE

“The logistics progression is a system of links, and one must know how they interface.”

Lieutenant General Benjamin F. Register, Jr., USA²³

Chapter two established a framework for comparing Air Force and Army logistics organizations. This chapter will provide factual information from each service’s doctrine or, in the Air Force’s case, the public documents produced in the Air Staff that describe the organizational structure of the three core logistics functions of supply, transportation, and maintenance at the tactical level. The Air Force’s highest tactical level is the combat wing. The comparison in the Army is the combat division. Each logistics organization will be described on three levels: first, the overarching concepts that guide logistics decisions; second, each service’s multifunctional logistics concepts will be described by explaining their multifunctional logistics officer management program and their multifunctional logistics units’ structure; and finally, a description of wing and division organizational structure will identify linkages between logistics functions.

AIR FORCE TACTICAL LOGISTICS ORGANIZATION

OVERARCHING LOGISTICS CONCEPTS

According to the CSAF, General John Jumper, there are two overarching purposes for the new Combat Wing Organization (CWO) logistics construct. First, and foremost, the purpose is “Posturing Aircraft Maintenance for Combat Readiness”. This was the title of the presentation General Jumper gave to the previous CSAF that brought about the Chief’s Logistics Review

²³ *Quotes for the Air Force Logistician*, (Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001), 14.

(CLR).²⁴ The CLR subsequently identified that purifying maintenance was one of the requirements for improving its combat readiness. This required the disestablishment of the Logistics Group in favor of a more specialized Maintenance Group. The result was a requirement to find a new home for the supply and transportation functions, as well as the Air Force unique logistics plans function. This led to the second stated purpose of the new CWO, namely, improving Air Force expeditionary capability.

The second overarching purpose for the CWO, is the recognition that the Air Force is an expeditionary force. That is to say that the common operational expectation is to be able to establish Air Force operations almost anywhere in the world. The operational concept is that Air Force units will establish bases in order to launch and recover aircraft missions from those fixed locations daily. The options range from established airfields to bare base locations that require substantial infrastructure creation. The new Mission Support Group will lead the effort to establish Air Force “operational presence anywhere in the world.”²⁵ In order to avoid standing up another group within each wing, the Air Force chose to align all logistics functions, except maintenance, under the old Support Group, which was subsequently, renamed the Mission Support Group. This group will take the lead in improving this expeditionary capability. The Air Force multifunctional logistics readiness officers and the new Logistics Readiness Squadrons reside in these groups.

MULTIFUNCTIONAL LOGISTICS OFFICERS

The new Air Force multifunctional logistics officers are called logistics readiness officers (LRO). The logistics readiness officer career field combines the old career fields of supply, transportation, and logistics plans and programs. The LRO career field is new, but the concept of

²⁴ Michael E. Zettler, “Changing Air Force Logistics: Chief’s Logistics Review,” *Air Force Journal of Logistics*, 25, no. 2, (Maxwell Air Force Base, AL: Air Force Logistics Management Agency, 2001), 6.

²⁵ John P. Jumper, “Chief’s Sight Picture: Combat Wing Organization,” *Air Force Link*, no date [website on-line]; available from <http://www.af.mil/lib/sight/cworg.pdf>; Internet; accessed 15 July 2002.

creating logistics generalists is not. The new career field is a giant step toward fulfilling the dreams of many who extolled the virtues of the “generalist” over the “specialist” in the field of logistics. One of the early, influential proponents of the generalist concept was Lieutenant Colonel Michael E. Zettler. While attending the Industrial College of the Armed Forces (ICAF) in 1986, Lieutenant Colonel Zettler completed an individual studies program report titled, “Air Force Logisticians: Generalists or Specialists?” In this paper he concluded that “the Air Force needs to say that it intends to develop an officer core of logistics generalists.”²⁶ Lieutenant Colonel Zettler is now a Lieutenant General and the Headquarters Air Force Deputy Chief of Staff for Installations and Logistics (AF/IL).

General Zettler’s ICAF paper had significant impact soon after it was published. The Air Force spent the decade of the 1990s attempting to grow a cadre of logistics generalists. Without creating a new core career field or merging logistics career fields, it “cross-flowed” some of its officers at the rank of captain into a logistics job outside of the officer’s core specialty. This cross flow happened between the maintenance, supply, transportation, and logistics plans and programs career fields. The cross flow effort was fatally flawed, however, because it lacked three crucial things identified by General Zettler in his paper. First, while it had buy-in at senior levels, the colonel-level hiring authorities tended to still desire specialists for the most important leadership roles (i.e., commanders and key supervisors). Second, there were no clear career development procedures in place to “insure that the officers identified are properly used as they progress in rank.” Third, timing of cross flow assignments did not consider the challenges of career broadening officers competing with specialists for promotion recommendations.²⁷ Finally, when the Air Force created the Logistics Groups and began the cross flow program, the senior leadership placed colonels who had never been career broadened into command of logistics

²⁶ Michael E. Zettler, “Air Force Logisticians: Generalists or Specialists?”, Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 62.

²⁷ Ibid., 68-71.

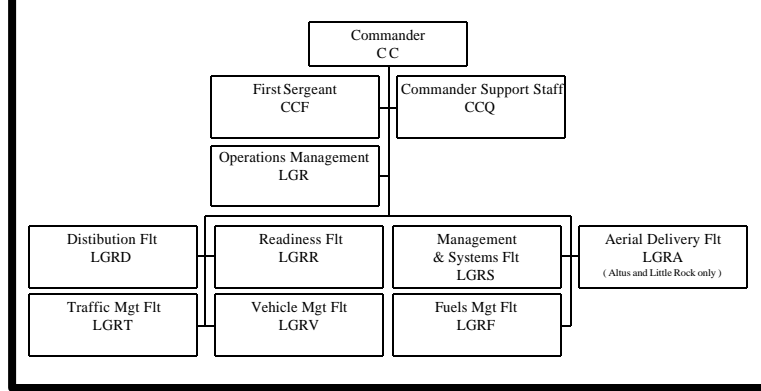
groups in whose primary mission they had no experience (e.g., transportation careerists were placed in command of logistics groups focused entirely on fighter aircraft maintenance and totally absent of any transportation function). All of this led to perceptions of program inadequacy. These perceptions coupled with the falling aircraft mission capable rates mentioned earlier make it is easy to see why cross-flowing has been significantly curtailed, if not killed, in the new logistics officer management construct. It is being replaced by an LRO career field that does not include maintenance officers.

Current supply, transportation, and logistics plans and programs officers immediately become logistics readiness officers. There will be training requirements for all company grade officers in order to be considered fully qualified, but this is only a short-term problem that will be overcome by time. The most important new concept for managing these officers is that new lieutenants will be accessed into the career field immediately upon entering the Air Force. They will be required to become fully certified in all three functional areas within four to six years of service. This certification is gained through technical training, professional continuing education, and on-the-job training and experience. Each LRO must gain from one to two years experience in each functional area in order to meet the experience requirements.²⁸ At the point they are fully certified, they are considered proficient to lead and manage any of the three functional areas within the career field. Ultimately these officers are expected to understand the full breadth and interrelationships across almost the entire logistics spectrum.

THE NEW AIR FORCE LOGISTICS READINESS SQUADRON

The training ground for the new LRO is the Logistics Readiness Squadron (LRS) (Figure 1). This squadron combines the former Supply Squadron and Transportation Squadron along with the logistics plans and program function. The standard LRS consists of six flights:

²⁸ Marcus G. Boyette, "Development of a Master's Degree in Operational Logistics for Logistics Officers," *Air Force Journal of Logistics*, 26, no. 2, Summer 2002, (Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002), 25.



Distribution, Readiness, Traffic Management, Vehicle Management, Fuels Management, and Management and Systems Flights. Of these, only the Distribution Flight, Management and Systems Flight, and the Readiness Flight are significantly different from what they had been in the previous two squadron format. The wiring diagram below provides a visualization of how these flights fit in the new squadron structure. The additional Aerial Delivery Flight is present only in two Air Force wings, and, as such, is not standard and will not be discussed in this paper.

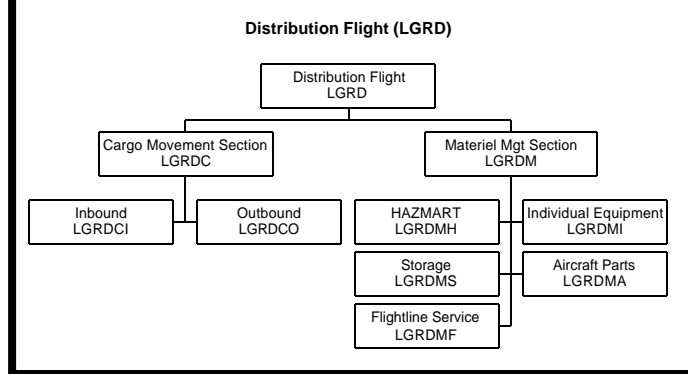
Figure 1: Logistics Readiness Squadron Structure²⁹

Fuels Management, Vehicle Management, and Traffic Management Flights will continue to function as they did in the separate Supply and Transportation Squadrons. The Fuels Management Flight continues its responsibility “to ensure quality petroleum products, cryogenics fluids and missile propellants are acquired or produced and issued safely and efficiently to using organizations.”³⁰ The Vehicle Management Flight will be the “single authority and source for maintenance and operations of an installation’s motor vehicle fleet. It will remain responsible for overall management, operation and maintenance of the wing’s vehicle fleet and account for, operate, and maintain vehicle assets so they are safe, efficient, and environmentally sound and meet the wing’s needs.”³¹ Finally, the Traffic Management Flight, commonly known as the Traffic Management Office or TMO across the military services, will maintain responsibility for “arranging the movement and storage of personal property and providing ticketing for official travel of DoD [Department of Defense] passengers. Leisure travel (unofficial travel) ticketing and tours

²⁹ Department of the Air Force, *Program Action Directive (PAD) 02-05: Implementation of the Chief of Staff of the Air Force Direction to Establish a New Combat Wing Organization Structure*, (Washington, D.C.: Headquarters United States Air Force, 2002), T-3.

³⁰ Ibid., T-VII-1.

³¹ Ibid., T-VI-1.



contractors may also be attached to or overseen by this flight.”³² With this understanding of what stays the same under the new LRS, it is now appropriate to explain what will change.

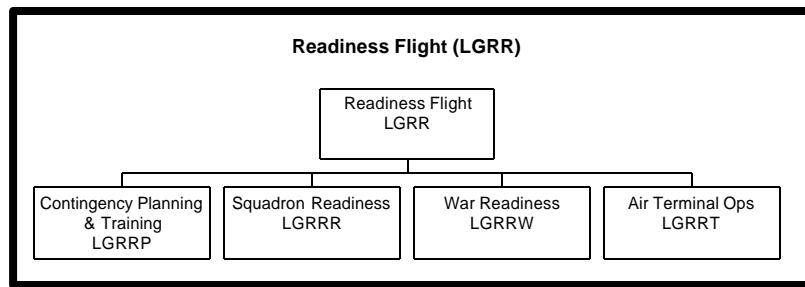
Figure 2: Distribution Flight Structure³³

The first of the three flights affected by the new squadron concept, the Distribution Flight (Figure 2), is designed to “be the single wing authority for receiving, storing and shipping DoD supplies and equipment.”³⁴ The largest impact will be felt in the Cargo Movement Section’s Inbound Element. This element combines the old supply squadron Receiving Section and the old TMO inbound freight section. The idea is that by combining these two sections efficiency can be gained by eliminating redundant handling and documentation. This efficiency is expected to translate into shorter pipeline times that get supplies in the hand of the customer faster and reduce the stock requirements on the shelf to meet target on-hand levels. All other Distribution Flight elements are essentially the pure functions they were prior to the LRS creation. The Outbound Element is the old TMO Preservation and Packaging combined with its Outbound Freight function. The hope is that, where feasible, all transportation freight and supply operations can be collocated in the same facility in order to maximize the efficiencies of the LRS. The Materiel Management Section is made up of traditional supply functions. The key element is the Flightline Service Center (FSC) Element. The FSC is the interface with the primary customer, the Aircraft Maintenance and Maintenance Squadrons. This element establishes the forward supply points in the customer’s work area. All other Materiel Management Section elements are unchanged from when they were part of the Supply Squadron. This flight offers the new LRO

³² Ibid., T-V-1.

³³ Ibid., T-II-1.

³⁴ Ibid., T-II-1.



opportunities to get experience in two of the three core tasks, distribution and materiel management.³⁵

Figure 3: Readiness Flight Structure³⁶

The second flight affected by the LRS creation is the Readiness Flight (Figure 3). While the Distribution Flight combined only two of the previous functions, namely supply and transportation, the Readiness Flight combines all three: supply, transportation, and logistics plans. This flight will normally be the smallest in terms of manpower, and yet it is projected to be one of the busiest in the modern operations tempo environment. Only the Squadron Readiness Section will be focused on the LRS alone. This element performs the unit deployment manager (UDM) role of ensuring that the squadron's personnel and equipment are prepared to deploy. The other three sections of the flight are all focused on deploying the entire installation.³⁷

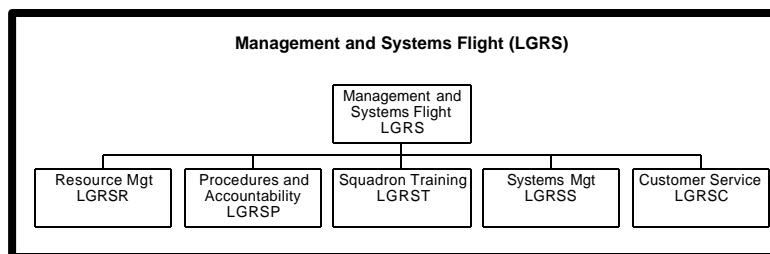
The Contingency Planning and Training Section prepares the logistics portion of war plans, trains all installation deployment managers and units on deployment procedures, and operates the installation's Deployment Control Center (DCC) and Cargo Deployment Function (CDF). The War Readiness Section, a former supply function, handles all aspects of storage and issue of mobility bags, chemical warfare defense equipment, and base defense small arms storage and issue. The Air Terminal Operations Section, a former transportation function, is responsible

³⁵ Ibid., T-II-1 to T-II-3.

³⁶ Ibid., T-III-1.

³⁷ Ibid., T-III-2.

for all mobility aircraft tracking and scheduling, ground handling, loading, and unloading. This



includes passenger and cargo processing, plus ensuring intransit visibility.³⁸

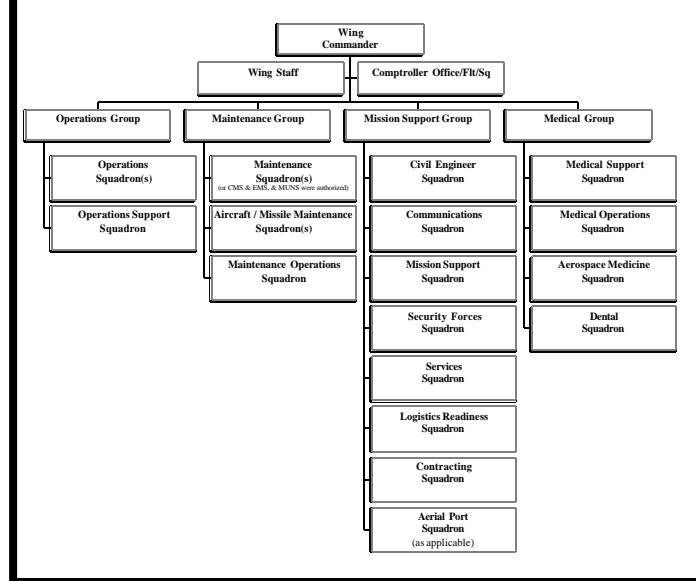
Figure 4: Management and Systems Flight Structure³⁹

Finally, the Management and Systems Flight (Figure 4) will be responsible “for the training, resources, and systems required to ensure the efficient and effective operation of squadron processes.” This flight is similar to a former supply squadron structure, but only the Customer Service Section remains a purely supply function. This section is the supply function’s primary interface with the customer. It is also the customer’s link to the Air Force Regional Supply Squadrons (RSS). The other sections of this flight will combine all three core functional areas. Resource Management manages squadron funds and facilities, and assists the LRS Commander with strategic planning. The Systems Management Section will be responsible for integrating squadron computer systems, maintaining local area networks, database management, and systems security. Squadron training will consolidate the training management sections from all three core functions and ensure squadron members are properly trained to conduct its wide variety of missions. Finally, the Procedures and Accountability Section is the squadron quality assurance focal point. It is responsible for the internal surveillance and self-inspection programs, document accountability and control, conducting data analysis, and oversight of supply inventory management. This section is the LRS Commander’s tool to ensure the squadron is operating efficiently and effectively.⁴⁰

³⁸ Ibid., T-III-1 to T-III-3.

³⁹ Ibid., T-IV-1.

⁴⁰ Ibid., T-IV-1 to T-IV-3.



COMBAT WING ORGANIZATION (CWO)

Figure 5: Combat Wing Organization Structure⁴¹

With this understanding of the Air Force multifunctional logistics structure it is necessary to examine how this structure integrates into the new Combat Wing Organization (CWO). First, an understanding of the CWO structure is required. The CWO organization structure is presented graphically in Figure 5 above. Next, because the logistics system of a unit includes the maintenance function, it is necessary to gain a basic understanding of how maintenance is structured and how the LRS interfaces with it. Finally, understanding how the entire wing logistics structure supports the operational mission is crucial to evaluating the efficacy of the structural design.

The new CWO structure gained initial operational capability 1 October 2002. Full operational capability is projected for no later than 30 September 2003. The general picture of the CWO structure is that there are three “pure” or specialized groups (i.e., Operations, Maintenance, and Medical) and one multi-functional group (i.e., Mission Support Group).⁴²

Three squadrons and their respective groups form the basis for describing how the Air Force logistics construct is tied together and how it is tied to the operational mission: Aircraft Maintenance Squadrons, Maintenance Operations Squadrons, and Logistics Readiness

⁴¹ Ibid., A-I-1.

Squadrons. The Maintenance Squadron will not be discussed, because it is essentially internal to how the maintenance community has decided to conduct multi-level maintenance. This does not materially affect how the logistics system interfaces with the operational mission, nor how maintenance fits into the logistics construct. Two unique logistics squadrons that will not be discussed are the Missile Maintenance Squadrons and Aerial Port Squadrons. These squadrons are unique to a small portion of the Air Force, and as such, would add little to the comparison of Air Force and Army multifunctional logistics. The critical logistics linkages in the CWO are between the Maintenance and Operations Group and between the Maintenance and Mission Support Group. The following discussion will examine how the Aircraft Maintenance Squadrons and the Maintenance Operations Squadrons integrate the Maintenance Group into the CWO logistics structure and how they tie the logistics structure to the operational mission.

MAINTENANCE OPERATIONS SQUADRON

The Maintenance Operations Squadron (MOS) (Figure 6) is the primary Maintenance Group (MXG) connection to CWO logistics structure. The MOS is the MXG Commander's scheduling, planning, training, and coordination squadron.⁴² The Maintenance Training Flight is the only portion of the MOS that focuses almost exclusively internally within the MXG. The other two flights deal not only with maintenance issues internal to the group, but they, also, plan and coordinate maintenance activities with the Operations Group and the Mission Support Group, specifically, the LRS.

⁴² Ibid., 2-5.

⁴³ Ibid., U-3 to U-4.

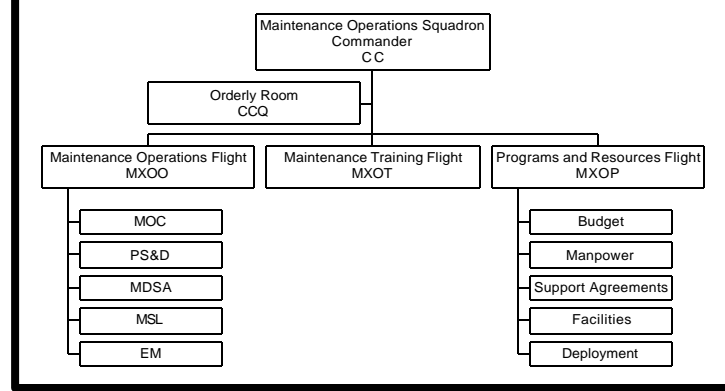


Figure 6: Maintenance Operations Squadron Structure⁴⁴

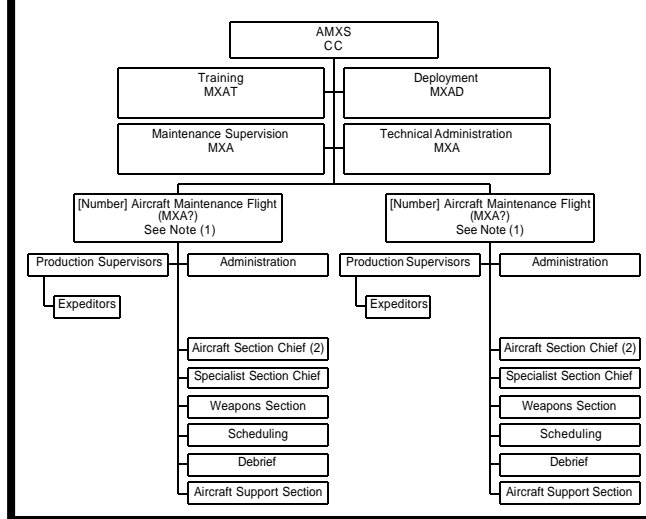
Of these two, the heavy lifting in the squadron falls to the Maintenance Operations Flight (MOF). The MOF focuses on aircraft fleet health in all that it does. It works closely with flying squadrons to build a flying schedule that accomplishes the wing's operational training requirements, while still ensuring the aircraft fleet is ready for war and prepared for future training requirements at the same time. Part of ensuring fleet health revolves around a close working relationship with the supply function in the LRS. To facilitate this, the LRS provides at least two non-commissioned officer (NCO) supply technicians to serve in the MOF Maintenance Supply Liaison (MSL) Section. These technicians are rated in the LRS chain of command, but physically reside in the MOS/MOF in order to coordinate supply requirements that cannot be predicted using demand data.⁴⁵

The Programs and Resources Flight (PRF) works many internal issues, such as budget, manpower, and facilities, but it also coordinates closely with the MSG on support agreements and deployments.⁴⁶ The most visible of these is deployments. The PRF is the primary interface to provide maintenance requirements to the LRS Readiness Flight for deployment transportation, beddown, and sustainment. This interface is the most crucial integration effort in the wing for crisis action deployment planning and execution. Without good coordination between the PRF and the LRS Readiness Flight, the entire deployment can be fatally flawed resulting in the inability of the wing to execute its wartime mission.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.



AIRCRAFT MAINTENANCE SQUADRON

The Aircraft Maintenance Squadron (AMXS) (Figure 7) is where Air Force logistics meets Air Force combat operations. The entire logistics process is designed to make aircraft fly, fight, and win, and the AMXS personnel are the ones that take the results of the entire logistics system and make the mission happen. The members of this squadron work closely with the MOS, the LRS, and the flying squadrons to ensure the ultimate success of Air Force logistics.

Figure 7: Aircraft Maintenance Squadron Structure⁴⁷

The AMXS is organized primarily around its Aircraft Maintenance Flights (AMF). Each flight is formally associated with an individual flying squadron. When deployed in a real-world operation, an AMF will deploy with and work directly for its flying squadron. As such, an AMF is the primary MXG interface with each flying squadron. This means they must be constantly coordinating with MOF to ensure that MXG resources are being properly utilized to meet mission requirements. Additionally, the AMF is the first to know of impending supply and deployment requirements. The AMF deals directly with the Flight Service Center (FSC) and Customer Service Elements in the LRS Distribution Flight. In this role, they are the daily connection that keeps the wing logistics structure working together.⁴⁸

⁴⁷ Ibid., U-6.

⁴⁸ Ibid., U-7 to U-8.

ARMY TACTICAL LOGISTICS ORGANIZATION

OVERARCHING LOGISTICS CONCEPTS

The Army logistics system is based on several overarching concepts. The first is that all logistics functions must operate in an integrated manner in order to provide the greatest capability to combat units. This requirement for integration drove the Army to multifunctional logistics which allowed it to produce leaders and organizations that understood all aspects of the logistics system and how to integrate them for maximum advantage.⁴⁹ The second overarching logistics concept is the move from supply-based logistics to a distribution-based logistics paradigm. Distribution-based logistics requires less reliance on forward stocks of supplies and more on total asset visibility, rapid, responsive distribution and redistribution of materiel and resources, and flexibility from logistics leaders and organizations.⁵⁰ The final concept that drives Army logistics is called “Fix Forward.” This maintenance tenet aims to repair combat systems “at the earliest opportunity, as close to the using unit as possible.”⁵¹ This maintenance concept, coupled with distribution-based logistics, makes the requirement to integrate and synchronize the actions of the entire logistics system all the more critical. Along with this explanation of logistics concepts, it is necessary to understand the operational concept to be supported. The Army operates on a moving battlefield. They do not bed down at one location, launch all attacks from that location, and return to that location at the end of each day. The logistics structure must support an organization that changes locations almost daily, and rarely returns to a home base to refit and rearm for its next fight. Therefore, its logistics structure must be mobile and able to operate in geographically

⁴⁹ Department of the Army, *Field Manual 100-10: Combat Service Support* (Washington, D.C.: Headquarters Department of the Army, 1995), 1-4 to 1-14.

⁵⁰ Martin S. Wagner, “Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?”, MMAS monograph, (School of Advanced Military Studies, 2000), Chapter I.

⁵¹ Department of the Army, *Field Manual 100-10: Combat Service Support* (Washington, D.C.: Headquarters Department of the Army, 1995), C-2.

separated locations. These logistics concepts and operational requirements demand integration of the system through a multifunctional logistics construct.

MULTIFUNCTIONAL LOGISTICS OFFICERS

The Army has three military occupational specialty branches for its logistics officers: quartermaster (supply), transportation, and ordnance (maintenance and munitions). Officers new to the logistics system are accessed into one of these three branches. They gain proficiency and expertise in their particular specialty through the rank of captain. This provides the necessary depth of knowledge required for multifunctional logistics organizations to conduct specialized logistics functions while at the same time making proper integration decisions to enhance combat capability. Captains receive multifunctional logistics training at the Combined Logistics Officer Advanced Course (CLOAC). In addition to CLOAC attendance, these captains are also required to complete the non-resident portion of the Support Operations Officer Course.⁵²

At this point officers can be considered for the Army's Multifunctional Logistician Program Functional Area (FA90). Captains who are branch qualified in their core logistics branch and who complete the Support Operations Officer Course can compete to fill FA90 coded assignments. Those who complete at least 24 months in an FA90 billet are then considered qualified to fill the next higher level FA90 positions. For majors, the qualification requirements also include completing Army Command and General Staff College. These officers are then qualified to lead multifunctional logistics units as operations officers and commanders.⁵³

⁵² Martin S. Wagner, "Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?", MMAS monograph, (School of Advanced Military Studies, 2000), Chapter II, Section 5.

⁵³ Department of the Army, *Department of the Army Pamphlet 600-3: Commissioned Officer Development and Career Management*, (Washington, D.C.: Headquarters Department of the Army, 1998), 173-176.

MULTIFUNCTIONAL LOGISTICS UNITS

This paper will not describe the Army logistics unit structure in the same way it did the Air Force structure. Unit descriptions will not be followed by a discussion of how those units integrate across equivalent command levels within the division, because, unlike the Air Force CWO structure, all Army logistics units within the division are multifunctional and subordinate to the Division Support Command (DISCOM) commander. The only logistics function in the division that does not work directly for the DISCOM commander is the division commander's logistics staff officer, the G-4. The division G-4, as the division commander's logistics planner, works with the division G-3, Operations Officer, to integrate logistics into the division's operational plan. During this planning, the G-4 develops all plans, policies, and priorities in close cooperation with the DISCOM commander and his staff.⁵⁴ With this in mind, the following discussion focuses exclusively on the DISCOM organizational structure and how that structure aims to achieve the integration required in the logistics system.

DIVISION SUPPORT COMMAND

The DISCOM is one of six major subordinate commands within a normal heavy division in the Army. "The DISCOM commander is the principle logistics operator in the division." He commands all of the division's support units. To carry out these duties, the DISCOM is organized into four distinct entities: Headquarters Company/Materiel Management Center (HHC/DMMC), an Aviation Maintenance Company (AMCO), the Main Support Battalion (MSB), and one Forward Support Battalion for each of the three maneuver brigades in the division (Figure 8). The HHC, DMMC, AMCO, and MSB normally operate in the division rear area typically located in the division support area (DSA).⁵⁵

⁵⁴ Department of the Army, *Field Manual 63-2: Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions*, (Washington, D.C.: Headquarters Department of the Army, 1991) 1-1.

⁵⁵ *Ibid.*, 1-3 to 1-4.

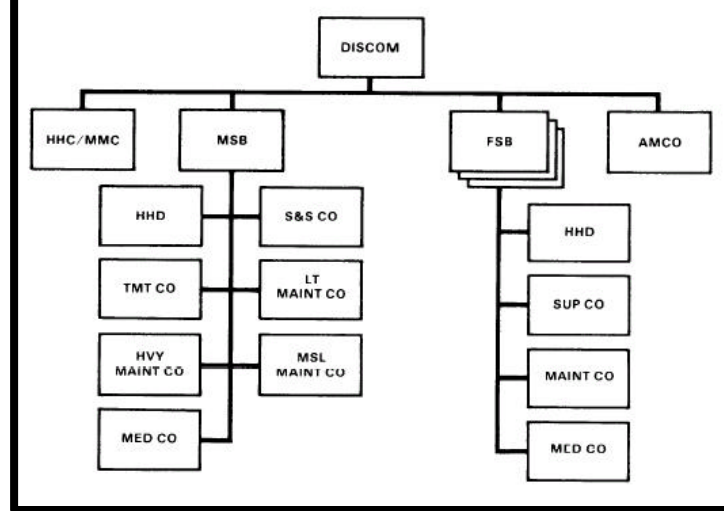


Figure 8: Division Support Command Structure⁵⁶

The HHC/MMC supervises and controls all division logistics operations. It, also, advises the division commander and staff on all aspects of supply, maintenance, and transportation functions throughout the division. The HHC provides all administrative, supply, and maintenance for the company, DMMC, and AMCO. The DMMC is responsible for materiel management. It advises the DISCOM commander on supply and maintenance materiel management. The DMMC is critical to division logistics success. It determines supply requirements, orders and directs the distribution of all supplies except medical, develops the authorized stockage and prescribed load lists, and operates the division maintenance management information program.⁵⁷ The DMMC is the DISCOM commander's connection with the multifunctional logistics battalions.

The aircraft maintenance company (AMCO) works directly for the DISCOM commander. It performs all aviation intermediate maintenance (AVIM) and supply support for division aircraft, normally this includes observation, utility, and attack helicopters. The company operates from the division rear area and will send recovery/maintenance teams forward when required.⁵⁸

MAIN SUPPORT BATTALION

⁵⁶ Department of the Army, *Field Manual 63-20: Forward Support Battalion*, (Washington, D.C.: Headquarters Department of the Army, 1990), 2-2.

⁵⁷ Department of the Army, *Field Manual 63-2: Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions*, (Washington, D.C.: Headquarters Department of the Army, 1991) 1-4.

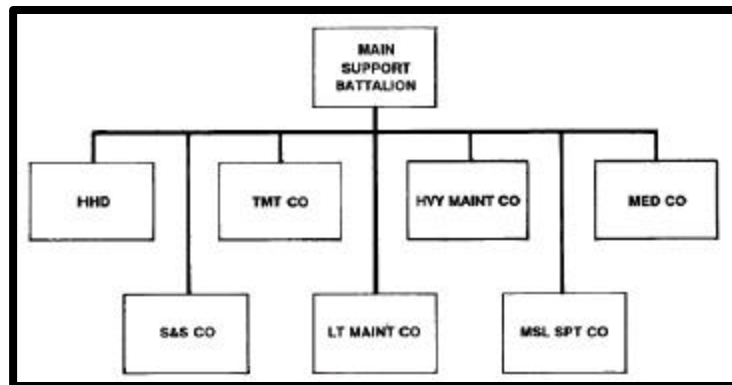


Figure 9: Main Support Battalion Structure⁵⁹

The main support battalion (MSB) has two missions. It is the division logistics operator in the rear area. In this capacity, the MSB provides direct supply, transportation, and maintenance support to division units operating in the division rear area. Its second mission requires it to push division-level logistics assets forward to augment the FSB's when required. The integration of the division logistics elements allow the MSB to play a critical role in supporting units outside the DSA in order to provide flexibility and additional combat power to the division. To carry out its mission the MSB has a headquarters detachment, a medical company, and five logistics functions (Figure 9). The following discussion explains the purpose and organization of each of the five logistics companies.⁶⁰

The supply and service company (S&S Co) provides receipt, temporary storage, and issue of rations, minimum personal equipment items, bulk fuel, barrier equipment, and combat replacement end items. Additionally, the company provides water purification and distribution services in the division and brigade support areas. It also provides supply support to the FSBs. The company provides unit-level maintenance for its own equipment.⁶¹

The transportation motor transport company (TMT CO) is the truck transportation provider for the division. It distributes supplies and conducts heavy and outsized vehicle and

⁵⁸ Ibid., 8-3 to 8-6.

⁵⁹ Department of the Army, *Field Manual 63-21: Main Support Battalion*, (Washington, D.C.: Headquarters Department of the Army, 1990), 1-5.

⁶⁰ Ibid.

⁶¹ Ibid., 5-1.

cargo movement for the division. It is the division's flexible transportation resource to provide surge transportation capability when other division element's capacity has been exceeded.⁶²

The light maintenance company (LT MAINT CO) provides direct support (DS) maintenance for division units not support by FSB maintenance companies. The MSB LT MAINT CO provides maintenance support to the FSB. The unique function of this company is that it has a supply platoon that operates the division repair parts (class IX) storage. Some common maintenance functions for this company are: communication and power generation equipment, refrigeration and air conditioning, and fuel and electronic components for the heavy maintenance company.⁶³

The heavy maintenance company (HVY MAINT CO) provides DS maintenance to division units not supported by an FSB maintenance company. Typical repair items include tracked and wheeled vehicles, engineering construction equipment, and armament equipment such as turret mounted weapons and laser range finders. It also organizes maintenance support teams (MSTs) to provide maintenance forward for systems like the multiple-launch rocket system (MLRS).⁶⁴

The missile maintenance company (MSL MAINT CO) provides DS maintenance for land combat and air defense missile systems. It operates a supply function for missile repair part (class IX) and reparable exchange in support of the FSB maintenance companies. While most of its work is done in the DSA, it does send out MSTs for missile systems not organic to the division's brigades.⁶⁵

FORWARD SUPPORT BATTALIONS

⁶² Ibid., 9-1.

⁶³ Ibid., 6-1.

⁶⁴ Ibid., 7-1 to 7-4.

⁶⁵ Ibid., 6-1.

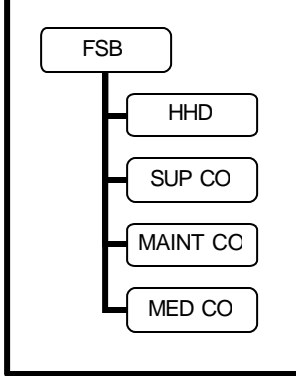


Figure 10: Forward Support Battalion Structure⁶⁶

There is one forward support battalion (FSB) for each operational maneuver brigade in the division. There are typically a total of three FSBs. Each battalion provides division-level logistics support as far forward as practical to support the combat actions of its respective brigade. The idea is to get as many supplies, weapon systems, and repair assets forward via field trains from the corps or MSB as practical to keep the brigade fighting strength at its maximum level without having so many support assets that they place an unreasonable burden on the brigade's ability to maneuver. Each FSB has a supply and maintenance company with which to provide the required support (Figure 10). They may at times request augmentation from the MSB in order to handle surge requirements.⁶⁷

The supply company (SUP CO) is made up of a supply section, an ammunition section, and a petroleum section. The supply section provides the brigade with rations, clothing, and individual equipment. The ammunition section, formally known as the Class V Section, performs transloading of munition supplies from corps transportation assets onto their organic transportation assets. The petroleum section stores and distributes fuel to the brigade. It has the capability to set up refueling on the move to support combat operations.⁶⁸

The maintenance company (MAINT CO) provides DS maintenance and repair parts service for brigade assets. This company is the key to the Army's "fix forward" logistics concept. It repairs anything from communications and power generation equipment to tank turrets and field artillery. The MAINT CO also arranges for evacuation of assets beyond their capability in

⁶⁶ Department of the Army, *Field Manual 63-20: Forward Support Battalion*, (Washington, D.C.: Headquarters Department of the Army, 1990), 2-2.

⁶⁷ *Ibid.*, 2-1 to 2-4.

⁶⁸ *Ibid.*, 7-1.

order to free the brigade the burden of this broken equipment. This company is the eyes-on link that keeps the entire logistics system integrated by anticipating future needs based on what is happening on the ground.⁶⁹

⁶⁹ Ibid., 8-1 to 8-2.

CHAPTER FOUR

“To be blunt, delivering the required equipment, in the right hands, at the right place, and at the right time, remains the overriding challenge for any logistic organisation.”

Air Commodore Peter Dye, Royal Air Force⁷⁰

The challenge addressed in Air Commodore Dye’s quote above ties directly into the opening quote by General Register in chapter two. In order to meet Air Commodore Dye’s “overriding challenge,” General Register’s logistics “system of links” must be integrated and synchronized. This chapter compares the Army multifunctional logistics construct with the emerging Air Force construct to determine if each service’s construct achieves the necessary logistics integration and synchronization. Four functional areas in the DOTMLPF structure frame the analysis: doctrine, organization, training, and leadership development and education.

DOCTRINE

Doctrine remains “the fundamental principles by which the military forces or elements thereof guide their actions.”⁷¹ Joint doctrine is the source of these fundamental principles when comparing two different military service systems. *Joint Publication(JP) 4-0: Doctrine for Logistics Support of Joint Operations* is the capstone logistics doctrine for the DOD. As such, it forms the basis from which to compare Army and Air Force logistics.

Joint logistics doctrine lays out four overarching concepts. First, it identifies the functions that make up logistics. JP 4-0 states that “logistic support requirements involve six broad functional areas: supply, maintenance, transportation, civil engineering, health services,

⁷⁰ *Quotes for the Air Force Logistician*, (Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001), 27.

⁷¹ Department of Defense, *Joint Publication 1-02: DOD Dictionary of Military and Associated Terms*, (Washington, D.C.: Chairman of the Joint Chiefs of Staff, 2003), 165.

and other services.”⁷² Those “other services” include: “food service, billeting, textile repair and clothing exchange, laundry and shower, postal, finance, personnel administration, religious, and mortuary affairs.”⁷³ Second, it states that “the efforts of logisticians at each level form a single, integrated logistic system.”⁷⁴ The levels referred to are the strategic, operational, and tactical levels of war. Third, the Chairman of the Joint Chiefs of Staff notes in his letter of introduction for JP 4-0 that DOD logistics is moving “from a supply-based to a distribution-based system”⁷⁵ Finally, JP 4-0 zeros in on the ultimate objective of tactical logistics by quoting Rear Admiral Henry Eccles. “[T]he end product of logistics lies in the operations of combat forces...In this area the major criterion of logistics is its effectiveness in creating and sustaining combat forces in action against an enemy.”⁷⁶ Summarizing within the context of this monograph, joint logistics doctrine states that the six logistics functions must form integrated logistics system focused on distribution-based processes that effectively deliver and sustain combat forces for the purpose of defeating any enemy.

This monograph has specifically focused on each service’s foray into “multifunctional logistics.” The Army’s excursion into this new logistics paradigm is more mature than the Air Force’s, but it is important to note that the paradigm is a deviation from the historical norm. Logistics has traditionally been conducted as discreet functional areas (i.e., supply, transportation, maintenance, etc.). The move to multifunctional logistics seems to have coincided with the move away from the supply-based logistics paradigm. Moving from supply-based to distribution-based logistics requires even more integration and synchronization of the entire logistics system. When a system requires discreet functions to operate more closely together, its leaders must understand

⁷² Department of Defense, *Joint Publication 4-0: Doctrine for Logistics Support of Joint Operations*, (Washington, D.C.: Chairman Joint Chiefs of Staff, 2000), I-2.

⁷³ Ibid., I-3.

⁷⁴ Ibid., I-2.

⁷⁵ Ibid., CJCS Introductory Letter.

⁷⁶ Henry E. Eccles, *Logistics in the National Defense*, (Westport, CT: Stackpole Books, 1959), 18.

more than just one function, and its organizational structures must do away with gaps that previously existed between functions. In other words, the system must function more as a seamless enterprise. Multifunctional logistics is the manifestation of joint doctrine's drive for an integrated system.

If multifunctional logistics is the manifestation of joint logistics doctrine, does either service have a multifunctional logistics construct that fulfills the doctrinal requirements? Army's construct includes supply, transportation, maintenance, health services, and various pieces of "other services", but does not include civil engineering. Its logistics support organizations include all of the functions needed to support the combat operations with which they are associated. Most importantly, the three core logistics functions operate closely together to ensure integrated and synchronized support of combat operations. Its leaders gain functional area expertise, but must broaden into other functional areas in order to move into positions of responsibility and authority in battalion-level organizations and above. Young officers gain functional expertise through multiple assignments within a single functional area, and they also get exposure to other areas due to the organizational structure. This allows them to appreciate other functional requirements, but most importantly, it allows them to understand how their area of expertise fits into the logistics system. With the exception of excluding civil engineering, Army multifunctional logistics seems to comply with the principles espoused in joint logistics doctrine. In its case, multifunctional truly means integrated.

The Air Force began venturing into multifunctional logistics a few years after the Army. In the early 1990's it created logistics groups that included the three core logistics functions. It, also, began "cross-flowing" officers between functional areas in an attempt to create a pool of logistics generalists. The primary flaw in the system came in the maintenance organization. While the logistics groups had supply, transportation, and maintenance squadrons, they did not maintain responsibility of flightline maintenance. Flightline maintenance is unit-level maintenance conducted by servicing aircraft and basic pull-and-replace maintenance for problem

parts. Responsibility for this type of maintenance was entrusted in the operations group.

Splitting maintenance responsibilities caused a gap in the integration required for a logistics system to function efficiently and, most importantly, effectively. The failure of this foray into multifunctional logistics resulted in the current multifunctional logistics construct.

The current Air Force multifunctional logistics construct has in some ways become more multifunctional and in some ways less. Maintenance functions are more integrated with the consolidation of maintenance under the new maintenance group structure. Supply, transportation, and logistics plans functions are now collocated in one squadron organization. Officers in the new LRS are required to achieve certification in each functional area within the squadron. The LRS is now aligned under the same group as civil engineering and the “other services” functions of logistics. All of this is good when taken independently, but independent evaluation sheds no light on the doctrinal requirement for integrated logistics.

One must not forget that integration is aimed at produces effective support for the purpose of combat. Separation of the three core logistics functions creates a significant gap in the Air Force logistics system. Aircraft maintenance is the most critical customer of the supply function in peacetime and wartime. During wartime deployment operations, aircraft maintenance is also the primary user of transportation assets. Maintenance is the most critical element to synchronize into theater to ensure the most rapid achievement of real combat capability. Separating the functions of supply, transportation, and maintenance has created organizational gaps that impede Air Force logistics integration. Additionally, the separation of the logistics functions will effectively stop “cross-flow” of officers between maintenance and the logistics readiness officer career fields. Cross-flowing no longer enhances officers’ ability to assume positions of greater responsibility; therefore, there is little or no opportunity for increased understanding between the two Air Force logistics officer tracks. This problem, along with the gaps caused by organizational boundaries, causes the Air Force logistics construct to be less multifunctional and, therefore, less integrated than the Army construct.

The integration required by doctrine essentially follows a line backwards from the combat forces through each support function in succession. The tactical logistics chain that leads directly to combat power has the following links: combat forces rely directly on maintenance to generate mission capable weapon systems; maintainers rely directly on supply to deliver the required parts and equipment; supply relies on transportation to move parts from vendors to bases for issue on the flightline. Martin Van Creveld highlighted the fact that in modern warfare “[t]he products of the machine—shells, bullets, fuel, sophisticated engineering materials—had finally superseded those of the field as the main items consumed by armies.”⁷⁷ No other logistics players directly impact every combat and training mission. The three M’s of logistics have been and always will be movement, materiel, and maintenance. The integration of these three is the bedrock of joint logistics doctrine. With this as the basis for comparison, Army logistics is more doctrinally correct than Air Force logistics.

ORGANIZATION

The “O” in DOTMLPF is organization. It is the way military services or elements thereof group their members, give them specific responsibilities, and focus them on accomplishing a particular mission. For the purpose of this study, the Army and Air Force logistics constructs will be analyzed to determine the benefits and drawbacks associated with each chosen organizational structure. These benefits and drawbacks will be evaluated against each service’s mission and standard operating practices to determine if the particular logistics structure supports mission accomplishment.

Army tactical logistics is organized in multifunctional units all the way down to battalion level. Each combat brigade is support by a forward support battalion (FSB). Even the FSB maintenance companies have an organic supply function that maintains the required class IX

⁷⁷ Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, (New York, NY: Cambridge University Press, 1977), 233-234.

replacement parts for the companies to accomplish their missions. The FSB is made up of a supply company with its own transportation assets to move items around the brigade area of operation (AO), a maintenance company as described above, and a medical company. The great warfighting benefit of this organizational structure is that the supply and maintenance company commanders sit around the same battalion staff meeting table. They know each other personally and hear each other's critical issues on a regular basis. This engenders a spirit of teamwork and results in the most integrated logistics support possible for the combat brigade. All the functions of the FSB relate directly to support required by mobile ground combat brigades. Rarely do these brigades operate from a permanent base camp that is collocated with the other brigades of the division. Once committed to combat, they must have access to all aspects of logistics support. The inclusion of medical in the FSB makes sense for ground combat units, because history has shown that even when one side possesses overwhelming advantages casualties are still very likely. The FSB organizational structure provides all required logistics support from life support to weapon system support in a standing unit that has a habitual relationship with the combat organization they are supporting. This results in teamwork that translates into trust, efficiency, and effectiveness.

While FSBs have habitual relationships with the combat brigade they support, their chain of command remains to the senior division logistician, the DISCOM commander. This ensures that division logistics assets are maximized. The DISCOM commander is the senior logistics integrator in the division. To support the division headquarters, rear elements, and to reinforce the FSBs, the DISCOM commander relies on the main support battalion (MSB). This battalion is also multifunctional. Because the division support area (DSA) and headquarters are located further from front line combat, the MSB consists of a greater quantity and range of support functions than an FSB. This aligns well with the traditional combat role of divisions in the Army. The MSB relies on the DISCOM commander and staff to prioritize its allocations of time and resources in support of the division, as well as, its augmentation of FSBs. This prioritization role

enables the DISCOM commander to truly integrate the entire division logistics enterprise. This integration and prioritization capability is the strength of the Army logistics organization.

Army FSB organizational structure is multifunctional due to operational mission requirements. The Air Force logistics squadrons are organized functionally with the same eye on mission success. Typically, an Air Force wing goes to war together. Every squadron may not be tasked, but those that are bed-down at the same deployed location. Missions are flown from that base for the entire conflict. Missions depart daily and return to the same location. The efficiencies gained from functional squadrons greatly outweigh the benefits of multifunctional logistics squadrons in this operational concept.

This same line of thought highlights the triumph of the CWO, the Air Force maintenance reorganization. Consolidating the sortie generation and fleet health maintenance functions allows the wing's senior maintenance officer to integrate all maintenance efforts in order to maximize wing combat power. Dedicated aircraft maintenance flights (AMFs) still provide flying squadrons with maintainers that are part of the team and take ownership in squadron success. One obvious benefit is that all AMF maintenance technicians will now be trained to the same standard and have the aircraft maintenance squadron (AMXS) structure for sharing lessons learned. Additionally, the integration achieved by having one maintenance arbitrator makes the entire maintenance effort operate more smoothly.

The remainder of the Air Force logistics restructuring has associated logistics functions that were previously unassociated. Consolidating the supply and transportation functions under the same squadron is likely to achieve some efficiency in distribution services. Perhaps the time to get parts into the hands of customers will decrease due to these efficiencies. However, there seems to be little benefit in placing vehicle operations and vehicle maintenance with the supply function in the LRS. This close relationship might be justified if vehicles were difficult to maintain and relied heavily on supply for repair parts. Then the mission might dictate that a close relationship be established in order to predict maintenance demand. Or, if the primary mission of

the wing was deploying and operating motor vehicles, it might pay dividends having them closely with the deployment function in the LRS. This is not the case in most Air Force wings. The traditional functions of vehicle maintenance and operations require very different logistics skills than the supply or deployment functions. The ability to gain efficiencies by combining supply and transportation distribution functions does not justify combining every aspect of the two functions.

Additionally, the supply and transportation functions, by virtue of the fact that they now work for the mission support group (MSG), are now associated with civil engineering and “other services” addressed in joint doctrine. There may, as the Air Force leadership has advertised, be some improvement in the wing’s ability to fulfill its expeditionary function due to this association. But the association of these functions has caused gaps in the core logistics processes of Air Force wings. The critical evaluation is whether the improvements in bedded down capability will offset the problems that are likely to arise during deployment and employment operations due to the gaps in the core processes.

The major deficiency in the CWO is the abolishment of the logistics groups (LGs). The wing logistics enterprise must be walked backward from its final point of service to determine where there is need for the most logistics integration. The final point of service for the Air Force logistics enterprise is aircraft maintenance. All other logistics support is separated from the combat mission by at least one link in the logistics chain. Maintenance gets parts from supply, which gets them from transportation. General Zettler explained the linkages well in his ICAF paper.

The functions of plans, maintenance, supply and transportation are subsets of the whole, logistics. As subsets, they are interrelated and they rarely if ever function independently. The mission is best supported when the four functions are operating cohesively. As long as there is cross-over between subsets, an understanding of the complete system is essential.⁷⁸

⁷⁸ Michael E. Zettler. “Air Force Logisticians: Generalists or Specialists?”, Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 5.

The functions of maintenance, supply, and transportation have been intertwined for as long as there have been industrialized militaries. The other logistics functions identified in JP 4-0 have no direct link to the maintenance function. These other functions are important to the mission, but they have fewer requirements for integration with the core logistics functions than those functions have for integration with each other. Air Force civil engineering has a need for supply support, but much of its support during deployments comes from contracting. Every function every day in civil engineering does not require close integration with supply and transportation. The same argument fits for the Air Force logistics function called services. Services personnel operate dining, billeting, and morale, welfare, and recreation facilities. While these are all important to mission accomplishment, they do not require the same close integration with supply and transportation that maintenance does.

Integration of logistics functions leads to maximum combat power for military forces. History supports this premise and joint doctrine requires it. Army logistics is clearly more integrated than Air Force logistics. Army logistics organizational structure enhances integration for the purpose of supporting combat units. Air Force logistics organizational structure has gaps that require special organizational workarounds to minimize. Specifically, logistics integration in the MSG is not as directly tied to mission success as logistics integration in the LG organizational structure. The gaps created by the MSG and MXG structure make Air Force logistics much less integrated than Army logistics.

TRAINING

Creating multifunctional logistics officers is a real training challenge. Each functional logistics specialty is unique and complicated. The increased focus on training officers to maximize the contribution of the entire logistics enterprise does not alleviate the need for officers who are experts in each functional area. The need for integration did not magically make the skills required to be good maintenance officers the same as those of a good supply officer.

Supply, transportation, and maintenance have not all of a sudden morphed into one “logistics” function. They are each still very different functions within an organization’s logistics enterprise.

Colonel Kenneth Brown, US Army, in his National Security Essay, captures the entire multifunctional logistics officer dilemma in the following quote:

Functional specialization seems pathologically endemic to logistics...Excessive specialization is a dangerous symptom of the fragmentation forced on us by the advancement of technology. Apprenticing in some modern complex enterprise—warfare, for example—means ‘starting somewhere’ by specializing. Over-specializing, however, seems to lead us away from responsible action. The logistics system, for example, should ensure the maximum readiness of the Army’s truck fleet. When the fleet isn’t near maximum, the maintainer blames the supplier for the lack of parts, and they both blame the transporter for poor deliveries...Of course, the tendency to look outside of one’s realm to fix responsibility for failure is part of human nature. This instance, though, suggests that specialization creates an environment that opposes cohesion and the singleness of purpose on which complex enterprises depend for success.⁷⁹

Colonel Brown’s quote identifies the requirement for multifunctional logistics leaders, but he also notes that these leaders must start out as specialists. The foundation of any logistics training program must be specialization in one functional area. Then, and only then, can a leader appreciate how the system fits together and how the specialized requirements of each function are important to the entire enterprise’s success. This is the key to designing the training program for multifunctional logistics officers. Admiral Eccles summarizes this argument succinctly below:

Therefore, it is of vital importance to understand that regardless of how the logistic functions are assigned and divided, the functions themselves are the same and must be performed by qualified officers. Furthermore, these functions must be supervised and coordinated by senior officers who not only understand the full implications of their responsibility thereto but also understand the relationships involved therein.⁸⁰

The Army logistics officer training system follows this guidance to the letter. New logistics lieutenants are trained in the specifics of one logistics functional branch. They are given assignments that facilitate on-the-job training in that particular functional area, until they are

⁷⁹ Kenneth N. Brown, *Strategics: The Logistics-Strategy Link*, (Washington, D.C.: National Defense University Press, 1987), 58-59.

⁸⁰ Henry E. Eccles, *Logistics in the National Defense*, (Westport, CT: Stackpole Books, 1959), 56.

captains. At this point, the Army sends them to two multifunctional logistics training courses: the Combined Logistics Officer Advance Course and the Support Operations Officer Course. This multifunctional training is followed by assignment to a multifunctional unit for the purpose of gaining on-the-job training and experience in multifunctional logistics.

The Air Force approach is quite different. New lieutenants are assigned to one of the two Air Force logistics tracks: aircraft/munitions/missile maintenance or logistics readiness (i.e., supply, transportation, and logistics plans). The new maintenance lieutenants are further specialized into either the aircraft or munitions/missile maintenance tracks. The lieutenants are then trained to be maintenance specialists during technical school training classes. So far this complies with the philosophies laid out by Admiral Eccles and Colonel Brown. Maintenance officers build on this specialized training from this point on. LRO cross-flow opportunities and formal multifunctional logistics training are not part of the Air Force training plan for these officers. Their first real opportunity for working in other logistics functions comes on staff tours at higher headquarters. Maintenance officers are not part of the Air Force's multifunctional training plan, but they are expected to take on most of the senior logistics leadership positions in the Air Force.

While the maintenance officer training program focuses entirely on specialization, the LRO training program focuses entirely on multifunctional training. New lieutenants in the LRO career field go to technical school training that teaches them all of the logistics functions within their career field. Whereas, supply and transportation are still distinctly different functions, these new LROs are expected to be trained and experienced in both, plus the logistics planning function, within the first four to six years of their career. This training plan provides no functional expertise for the officers that are expected to be flight commanders in flights that specialize in one function or the other. Additionally, maintenance training is specifically excluded from the LRO career training plan.

This new logistics training initiative departs significantly from the one proposed by General Zettler in 1986. He recommended that officers get firmly grounded in one discipline before being broadened into another. “Specialization before generalization” is the way General Zettler proposed it in 1986.⁸¹ Maintenance officers become specialists and never transition to logistics generalists until it is too late for them to gain any practical experience in other logistics functions. LROs immediately become generalists and are never designed to gain expertise in any one logistics function. There is no plan to provide multifunctional training for the three core logistics functions. The Air Force logistics training program is not designed to result in logistics enterprise integration.

In the final analysis, the Army training plan produces multifunctional logistics officers prepared to maximize the integration of the Army logistics enterprise. The Air Force training plan does not produce multifunctional logisticians. It produces maintenance specialists and partial logistics generalists within the LRO career field.

LEADER DEVELOPMENT AND EDUCATION

Leader development and education require opportunities throughout an officer’s career that provide the experiences needed for future roles with increased responsibilities. The Army logistics officer leader development plan offers young officers opportunities to lead as a specialist in order to grow into generalists leadership positions. Lieutenants lead platoons in their functional specialty. Captains command companies in their specialty. Majors and lieutenant colonels receive intermediate service school (ISS) education and are given opportunities to lead multifunctional logistics organizations. From this point on, lieutenant colonels and colonels from quartermaster, transportation, and ordnance, as well as a limited number of medical service corps officers, are given the opportunity to command multifunctional battalions and above. They also

⁸¹ Michael E. Zettler. “Air Force Logisticians: Generalists or Specialists?”, Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 64-65.

complete senior service school education, either in-residence or correspondence. In Army logistics there is a steady progression of responsibility aimed directly at producing multifunctional logisticians who can integrate all logistics functions. Army senior logisticians are prepared to take on senior logistics leadership roles throughout the joint force because of the Army logistics leader development and education program.

Again, the Air Force leader development and education program for logistics officers is different from the Army. Air Force maintenance officer leader development works well up to the position of MXG commander. Young maintenance officers focus on their specialty and lead pure maintenance organizations. Typically, senior maintenance leaders move young lieutenants around the maintenance complex on a regular schedule to introduce them to the multiple facets of the aircraft or missile/munitions maintenance complex. These young officers grow into majors who complete ISS, either in residence or by correspondence, and subsequently take on the increased leadership responsibilities as either the maintenance supervisor or commander for one of the maintenance squadrons. Finally, lieutenant colonels and colonels, after completing SSS, are grown into commanders of larger maintenance squadrons and, finally, maintenance groups. These officers are maintenance professionals and can lead virtually any maintenance organization, but they are ill-prepared to assume the senior logistics leadership roles, especially in the joint arena where aircraft maintenance is not the primary logistics expertise required.

Logistics readiness officers begin growing logistics generalists from the beginning. The first six years of an officer's career is spent moving among very different logistics functional areas. No depth is built in any one area, thus these officers are likely to experience credibility problems with the troops they lead in the LRS. Only a rare few of these young officers are likely to have the leadership skills necessary to overcome the lack of professional competency normally demanded by subordinates in order to whole-heartedly follow their leaders. Ultimately, as these officers reach the rank of major, those that have survived will be fairly knowledgeable about the

spectrum of functions located in the LRS. The educational opportunities are the same as those mentioned above for maintenance officers, but the command opportunities are not.

Supply, transportation, and logistics plans officers previously competed for three primary squadron command opportunities: Supply, Transportation, and Logistics Support Squadrons. They now compete for only one command opportunity, the Logistics Readiness Squadron. Senior Air Force logistics leaders advertise that LROs can also compete for Regional Supply Squadrons and Aerial Port Squadrons, but these opportunities exist at a very limited number of locations throughout the Air Force. For maintenance officers, on the other hand, the opportunities have grown. They used to only compete for the maintenance squadron (or equipment maintenance and component maintenance squadrons where the squadrons were large enough) and the logistics support squadron. Now they can compete for those squadrons, plus the recreated aircraft maintenance squadrons. In fact, they also gained sole right to command the old LSSs, now called maintenance operations squadrons (MOS), without competition from other logistics career fields. Additionally, they added the handful of materiel maintenance squadrons, formerly commanded exclusively by logistics plans officers, to the list of uncontested command billets. As long as this situation remains, the Air Force will produce senior logistics leaders from its pool of maintenance specialists, because its logistics generalists will wither on the vine from lack of command opportunities. This will cause the Air Force to suffer in the joint arena from a lack of senior logisticians that understand the critical elements of logistics required for joint integration, specifically, supply, transportation, and logistics planning.

Once again, the Army seems to be ahead of the Air Force. Army logisticians are grown and educated to lead the joint force in logistics. If the Air Force hopes to present credible logisticians for joint leadership roles, it must reassess how it develops them as they grow up in the Air Force.

CHAPTER FIVE

“The functions of plans, maintenance, supply and transportation are subsets of the whole, logistics. As subsets, they are interrelated and they rarely if ever function independently. The mission is best supported when the four functions are operating cohesively.”

Lt. Col. Michael E. Zettler⁸²

CONCLUSIONS

The quote above is from Lieutenant General Zettler, currently Air Force Deputy Chief of Staff for Installations and Logistics, when he was attending ICAF. His quote lines up perfectly with logistics doctrine and history. Yet, despite doctrinal and historical guidance concerning the integration of these core logistics functions, the Air Force has traditionally placed some type of organizational barrier between the functions. Maximum integration, which would likely result in the best possible support and the greatest combat capability, cannot be achieved until the Air Force abandons its predisposition to keep the logistics functions working for separate commanders. In the last 30 years, the Air Force has never placed all core logistics functions under one commander within its wings.

The CSAF identified two objectives for the CWO. First, strengthen maintenance. The best way to do that, it is argued, is to consolidate maintenance under one leader within the wing. Additionally, General Jumper believes removing other logistics responsibilities from this senior maintainer will keep him or her from having to “worry about whether or not enough water has been ordered for the dining hall during deployments.”⁸³ The CSAF clearly wants the maintenance group commanders to focus strictly on maintenance. Second, improve the Air Force’s expeditionary capability. The best way to do this, it is argued, is to move the supply,

⁸² Michael E. Zettler, “Air Force Logisticians: Generalists or Specialists?”, Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 5.

⁸³ John P. Jumper, “The Chief’s View” (speech presented at the national conference of the Air Force Logistics Officer’s Association, Washington, D.C., 4 September 2002), quotes taken from author’s notes during the speech.

transportation, and planning functions into the mission support group and give that group commander responsibility for all deployment beddown and sustainment. These organizational changes aim to improve logistics support to the Air Force to make it more capable of getting to the war and flying and fighting once it arrives.

Does the CWO strengthen maintenance? The simple answer is yes. The more pertinent question, however, is, “does the CWO organize maintenance to provide the best possible maintenance support to Air Force wings?” The answer to this question is no. The move from supply-based logistics to distribution-based logistics means that the lead maintainer can no longer simply demand things from supply. Keeping aircraft flying when deployed in remote locations requires an in-depth understanding of the entire logistics system. Decisions need to be made about whether to order the part and repair the item when that part arrives or whether to pay for premium transportation to ship a part back to a “reach-back” maintenance function not located in the area of operation. This decision cannot be made unilaterally by transportation, supply, or maintenance. The most integrated logistics support could be achieved if the core logistics disciplines worked for the same boss. Distribution-based logistics requires this level of integration.

Does the CWO improve the Air Force’s expeditionary capability? The answer to this question is no. Linking the logistics readiness functions to the beddown and support functions may yield some improvements in the ability to initially establish a base in the middle of nowhere. The catch is that the de-linking from maintenance will result in greater detriment to a wing’s expeditionary capability than the minor improvements gained by training with the mission support group functions. Maintenance and its requisite supply assets are normally the biggest strategic lift requirement in an Air Force wing. Sequencing those assets into the deployment is the determining factor for how soon a wing achieves combat capability at the deployed location. Coordination of this critical link through liaisons across organizational boundaries asks for a return to the late 1980’s and early 1990’s where “getting it right” was difficult at best. Not until

the biggest deployment function customer and its operator sat regularly in logistics group commander staff meetings did the process improve. Now that improvement will disappear. The only part of the logistics readiness function with a stronger connection to mission support than aircraft maintenance is vehicle operations. This particular core logistics function is more closely aligned with base operations than with support to maintenance.

The next most critical aspect of the CWO is training. Maintenance training will certainly be emphasized. This will be a vast improvement, especially for the flightline maintenance personnel. They will now receive the same level of training and training emphasis regardless of the flying squadron they support. There is even an effort being made within Air Combat Command to establish an elite maintenance training program. It was previously called the Logistics Weapons School and was planned to stand up at Nellis Air Force Base, the same location for the flying Weapons School. The school was going to cover all logistics aspects of deploying and sustaining a flying wing for expeditionary operations. It was intended to include logistics readiness officers and maintenance officers. The emphasis was clearly on maintenance, because the only prerequisite was that officers chosen to attend had to have a maintenance air force specialty code (AFSC). This was a great concept for teaching future logistics leaders how the entire logistics chain supported Air Force operations. With the disbanding of the logistics groups, the school has been paired back. It now will be an advanced maintenance school only. This may be great for building specialists, but it does little for training logisticians with a complete systems view. In the leadership development discussion coming later, it will be evident that maintainers need to be inculcated with this systems view.

Logistics readiness officer (LRO) training suffers from a different problem than maintenance. Whereas maintenance officers will be trained to be specialists, LROs will be trained to know none of their core processes well. While efficiencies will certainly be achieved by creating the LRS, these efficiencies have in no way made the functions of supply, fuels, transportation, and logistics plans all one homogeneous function. They all require different

competencies, and they are all complicated and difficult. The plan to make new lieutenants have a breadth of operational and educational expertise that spans every function within the first six years of a career makes little sense. These officers may grow to quickly appreciate the logistics system requirement for integration, but none of them will be equipped with the depth of knowledge required to significantly contribute to improvements in that system. This is an unreasonable training plan.

The Air Force is developing a program it calls Phoenix Readiness. This training program is being developed to improve Air Force expeditionary capability is going to make a positive contribution. It will train the mission support functions that deploy, establish, and sustain an expeditionary beddown base. This training will provide valuable training that will result in improved expeditionary capability.

After the Air Force determines how to train its people, it must then determine how it plans to grow its leaders. In the DOTLM-PF construct, this is call Leader Development and Education. Currently, the Air Force has a pretty clear plan for growing maintenance leaders through the rank of colonel. Maintenance officers will be groomed for more senior maintenance leadership positions by climbing a ladder of job responsibilities within the maintenance specialty. Gaining breadth of experience outside of maintenance will be rare.

The LRO leadership development, on the other hand, ends at lieutenant colonel. Young officers are expected to gain breadth of experience in all LRO functions instead of depth in any one function. This is expected to prepare LROs to take responsibilities of flights and, ultimately, command of LRSs. After LRS command there is no clear leader development path. The next step is group command of the mission support group, but little of an LRO's earlier development has prepared the officer for MSG command. This is a complicated task, and it is being aggressively worked by the Air Staff.

Does the logistics officer development plan prepare either maintenance or logistics readiness officers to assume the responsibility for all logistics functions when they move to

positions of responsibility on staffs? Above group command, maintenance groups for maintainers and mission support groups for LROs, the logistics functions come back together on higher-level command staffs. Maintenance officers have been developed as specialists with little opportunity to learn the supply, transportation, or logistics plans functions. LROs have been developed as generalists, but with the handicap of not understanding maintenance in any depth. The leader development construct virtually ensures continuing the dominance of maintenance officers in positions of higher responsibility due to the command opportunities. The sheer number of maintenance squadron commands compared to the single LRS command in a wing ensures that maintenance officers will continue to hold the lead positions on the staffs. This may be satisfactory to the Air Force, but in the joint arena, it presents a problem. Joint logistics focuses primarily on supply and transportation functions. The specialty knowledge of aircraft maintenance is of very limited utility outside of the Air Force, but due to the officer development construct, the bulk of Air Force senior logistics leadership will be maintenance officers. The dearth of knowledge and experience in the aspects of logistics important in the joint arena virtually ensures the Air Force a backseat position in joint logistics. The Air Force will not be grooming logisticians to assume senior joint logistics leadership roles.

RECOMMENDATIONS

The recommendations that follow are not intended as a panacea for all Air Force logistics issues. They merely use common logistics practices and concepts to incrementally improve an already outstanding Air Force logistics enterprise. Three themes resonate throughout historical and academic logistics texts, as well as, joint and sister service logistics doctrine. First, supply, transportation, and maintenance are considered the 3 M's of logistics. They are consistently included as the core logistics functions. Other functions are added in one place and not in others, but the 3 M's are constant. Second, the three core logistics functions are distinct and separate, but they must function as an integrated system to maximize the support they provide combat units.

Third, logistics managers, normally officers in the military, must first be specialists in one of the core functions and then progress to become generalists as they rise in levels of responsibility.

The following recommendations link directly to one or more of these three themes.

Organizational change tops the list of recommendations. It links directly to all three of the common logistics theme presented above. The Air Force should reinstitute the logistics group structure. It is important to note that the Chief's Logistics Review (CLR) neither recommended nor tested the disbanding of the logistics groups. The CSAF personally added the idea after CLR test completion. Not one of the CLR panels recommended this change as a way to improve Air Force logistics. This is important, because the professional logisticians who made up the various CLR panels seemed to understand the first two common logistics themes. First, supply, transportation, and maintenance are the core logistics functions. Second, in order for these functions to function as an integrated logistics enterprise, they must be organized under a single logistics leader. The authors of *Contemporary Logistics* lay out the requirement for this single integrating logistics leader in the following quote:

“The systems approach to a problem involves not only a recognition of the individual importance of the various elements of which it is composed but also an acknowledgement of their interrelationship. Whereas field specialists concentrate restrictively on their own particular bailiwick, the more versatile systems people, in their capacity as generalists, seek the optimum blend of many of these individual operations in order to fulfill a broader objective.”⁸⁴

The best way to maximize Air Force logistics support to the warfighters is through a senior logistician who understands the importance of each individual element, but more importantly, also understands how to optimize the interrelationships in the system. The logistics group structure should be reinstituted throughout the Air Force.

A change in logistics officer training is the next most important recommendation. LRO training tops the list of training changes. This change relies on the third logistics theme.

⁸⁴ James C. Johnson and others, *Contemporary Logistics*, 7th ed., (Upper Saddle River, NJ: Prentice Hall, 1999), 11.

Logistics leaders should specialize before becoming generalists. The supply, transportation, and logistics plans career fields can remain combined into the new LRO career field, but new lieutenants should not be trained as generalists immediately. These young officers should receive a career field overview that emphasizes the interrelationships among the three functions during initial technical school training. The remainder of their initial training and their first two three-year assignments should be in one of the three functional areas. Upon becoming “expert” in one of the specialized functions, these officers, as young captains, should receive formal school training in one of the other functions to prepare them for a broadening job in that particular function for a period of two to three years. Finally, the officer should complete training in the third functional area via distance learning prior to his or her ninth year of service. At this point, the officer should complete a one to two year broadening tour in that final functional area. In summary, LRO training and leader development should be in three phases: Years 1-6) primary expertise built during six years of training and experience; Years 7-9) secondary specialization acquired; Years 10-11) broadening experience in preparation for field grade responsibility.

The current maintenance officer training plan conflicts with the same logistics theme as LRO training but from the opposite direction. LRO training plans to immediately create generalists with no opportunity for officers to specialize. Maintenance training plans to create specialists with no opportunity to become generalists. Air Force logistics doctrine must not push maintenance outside of the integrated logistics realm. A plan intended to mitigate this deficiency was put forward at the Fall CORONA in 2000. CORONA is conference where the Air Force 4-star generals meet to wrestle with significant issues facing the service. In the fall of 2000, the Air Force generals decided to pursue integrating logistics officer training into the Weapons School at Nellis Air Force Base. This concept was assigned for development to Headquarters Air Combat Command (HQ ACC) as CORONA tasker CFOOT-18. The training goal for the new Logistics Officer Weapons School (LOWS) was to “create a highly skilled operational logistician competent in the following wartime skills: Mobilization, Deployment, Beddown Sustainment,

Combat Employment, Redeployment, Reconstitution, and Command and Control (C2).”⁸⁵ This training was to include officers from the core logistics career fields with the stipulation that participants have at least one year of aircraft maintenance experience. The target training audience was logistic captains with no more than 9 years of service. The program seems to have gone the way of the logistics group. Because LROs now belong to the mission support group vice the logistics group, what was being stood up as a “Logistics Officer Weapons School,” is now purely an advanced maintenance training program. The original intent and structure of the LOWS should be readopted in order to grow senior logistics leaders with a deep understanding a professional competence for integrating the entire Air Force logistics enterprise.

Finally, logistics officer career broadening between maintenance and logistics readiness should be managed to ensure that future logistics leaders complete at least one cross-flow assignment. A genuine appreciation for the interrelationships within the logistics enterprise cannot be gained without this type of program. Under the current twogroup structure, no cross-flow will happen regardless of what is advertised from higher echelons. The logistics disciplines should be organized under one group, and the cross-flow requirement should be chiseled in stone in much the same way that congress required joint experience for promotion to general officer. No logistics officer should be allowed to command a logistics group without meeting the cross-flow requirement. General Zettler’s ICAF paper was concerned about creating the perception of elitism with the cross-flow program he recommended. He stated that, “[t]he specialist and the generalist must have equal opportunities for advancement.”⁸⁶ This must not be the case if the Air Force hopes to produces logistics leaders that can optimize the Air Force logistics enterprise and

⁸⁵ “Integration and Implementation Plan for The Logistics Officer Weapons School Training Initiative (CORONA C FOOT-18),” Technical Report, (Langley AFB, VA: ACC/LGQT-Synergy, Inc., 2001), 1.

⁸⁶ Michael E. Zettler. “Air Force Logisticians: Generalists or Specialists?”, Individual Studies Program Report, (Washington, D.C.: Industrial College of the Armed Forces, 1986), 61-62.

lead in the joint logistics arena. The Air Force must build strong specialists in its junior logisticians, but they must require generalists as senior logisticians.

Air Force logistics is strong. The CWO in its current configuration will raise mission capable rates and aircraft wartime readiness. There are, however, improvements that will make the Air Force a more capable fighting force for America. The Air Force logistics enterprise must be organized around the three core logistics functions of supply, transportation, and maintenance. That enterprise must be fully integrated by functional experts that are led by professional logistics generalists.

BIBLIOGRAPHY

- American Heritage Dictionary: Second College Edition*. Boston, MA: Houghton Mifflin Company, 1982.
- Baxter, Roger M., III. "Warfighter Support: Supply 2001," *AFLMA: 2001 in Review*, 126-131. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Bird, Carl D. "Force XXI Logistics: Bonanza or Bust for the Maneuver Commander." MMAS monograph, School of Advanced Military Studies, 1997
- Blanchard, Benjamin S. *Logistics Engineering and Management*. 4th ed. Ed. W.J. Fabrycky and J.H. Mize. Englewood Cliffs, NJ: Prentice Hall, 1992.
- Boyette, Marcus G. "Development of a Master's Degree in Operational Logistics for Logistics Officers," *Air Force Journal of Logistics* 26, no. 2 (Summer 2002), 24-26.
- _____. "Transportation: The Year in Review," *AFLMA: 2001 in Review*, 180-187. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Brown, Kenneth N. *Strategics: The Logistics-Strategy Link*. Washington, D.C.: National Defense University Press, 1987.
- Creech, Wilbur L. "How TAC Increased Command-wide Productivity 80% from 1978 to 1984," *Government Executive*, 17, no. 5 (1985): 14-18.
- Cunningham, Alan R. "Will the Force XXI Revolution in Military Logistics Support Coalition Operations in 2010?" Carlisle Barracks, PA: Army War College, 2000.
- Department of the Air Force. *Air Force Doctrine Document 2: Organization and Employment of Aerospace Power*. Washington, D.C.: Office of the Secretary of the Air Force, 2000.
- _____. *Air Force Doctrine Document 2-4: Combat Support*. Washington, D.C.: Office of the Secretary of the Air Force, 1999.
- _____. *Program Action Directive (PAD) 02-05: Implementation of the Chief of Staff of the Air Force Direction to Establish a New Combat Wing Organization Structure*. Washington, D.C.: Headquarters United States Air Force, 2002.
- _____. "Chief of Staff Logistics Review Introductory Brief." Headquarters United States Air Force. [Website on-line]; available from <https://www.il.hq.af.mil/clr/> ; Internet; accessed 3 November 2002.
- Department of the Army. *Department of the Army Pamphlet 600-3: Commissioned Officer Development and Career Management*. Washington, D.C.: Headquarters Department of the Army, 1998.
- _____. *Field Manual 3-0: Operations*. Washington, D.C.: Headquarters Department of the Army, 2001.

_____. *Field Manual 63-2: Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions*. Washington, D.C.: Headquarters Department of the Army, 1991.

_____. *Field Manual 63-20: Forward Support Battalion*. Washington, D.C.: Headquarters Department of the Army, 1990.

_____. *Field Manual 63-21: Main Support Battalion*. Washington, D.C.: Headquarters Department of the Army, 1990.

_____. *Field Manual 63-23: Aviation Support Battalion*. Washington, D.C.: Headquarters Department of the Army, 1996.

_____. *Field Manual 100-10: Combat Service Support*. Washington, D.C.: Headquarters Department of the Army, 1995.

Department of Defense. *Chairman of the Joint Chiefs of Staff Instruction 3180.01: Joint Requirements Oversight Council (JROC) Programmatic Processes for Joint Experimentation and Joint Resource Change Recommendations*. Washington, D.C.: Chairman of the Joint Chiefs of Staff, 2002.

_____. *Joint Publication 1-02: DOD Dictionary of Military and Associated Terms*. Washington, D.C.: Office of the Chairman Joint Chiefs of Staff, 2003.

_____. *Joint Publication 3-0: Doctrine for Joint Operations*. Office of the Chairman Joint Chiefs of Staff, 2001.

_____. *Joint Publication 4-0: Doctrine for Logistics Support of Joint Operations*. Office of the Chairman Joint Chiefs of Staff, 2000.

Eccles, Henry E. *Logistics in the National Defense*. Westport, CT: Stackpole Books, 1959.

Fuson, Jack C. *Transportation and Logistics: One Man's Story*. Washington, D.C.: Center of Military History United States Army, 1994.

Hall, J. Reggie. "Agile Combat Support Doctrine and Logistics Officer Training: Do We Need an Integrated Logistics School for the Expeditionary Air Force?" Maxwell Air Force Base, AL: Air Command and Staff College, 2000.

Hallin, William P. "Agile Combat Support—The New Paradigm," *Air Force Journal of Logistics* 21, no. 3 and 4 (Fall 1994): 1-3.

Hoffman, Cauley von. "Combat Support Command and Control for the EAF," *AFLMA: 2001 in Review*, 67-80. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.

Hunt, Andrew W. "Contingency Operations: When the Contingency is Over but Operations from the Location Aren't," *AFLMA: 2001 in Review*, 164-169. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.

- Huston, James A. *The Sinews of War: Army Logistics 1775-1953*. Army Historical Series. Washington, D. C.: Center of Military History United States Army, 1988.
- “Integration and Implementation Plan for The Logistics Officer Weapons School Training Initiative (CORONA CFOOT-18),” Technical Report, (Langley AFB, VA: ACC/LGQT-Synergy, Inc., 2001)
- Johnson, James C., Donald F. Wood, Daniel L. Wardlow, and Paul R. Murphy, Jr. *Contemporary Logistics*, 7th ed. Upper Saddle River, NJ: Prentice Hall, 1999.
- Jumper, John P. “Chief’s Sight Picture: CORONA Top 2002,” *Air Force Link* 12 July 2002 [website on-line]; available from http://www.af.mil/lib/sight/sight_corona02a.pdf; Internet; accessed 21 August 2002.
- _____. “Chief’s Sight Picture: Combat Wing Organization,” *Air Force Link* no date [website on-line]; available from <http://www.af.mil/lib/sight/cworg.pdf>; Internet; accessed 15 July 2002.
- _____. “The Chief’s View” (speech presented at the national conference of the Air Force Logistics Officer’s Association, Washington, D.C., 4 September 2002), quotes taken from author’s notes during the speech.
- Kaplan, Robert S. and David P. Norton. *The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard University Press, 1996.
- Leftwich, James, Kristin F. Lynch, David George, John G. Drew, Robert Tripp, and C. Robert Roll. “Chief of Staff of the Air Force Logistics Review: Evaluating Options for Improving Air Force Wing-Level Logistics Processes”. (RAND Project Air Force, DRR-2782-1-AF, September 2002). DRAFT.
- Magruder, Carter B. *Recurring Logistic Problems as I Have Observed Them*. Washington, D.C.: Center of Military History United States Army, 1991.
- Martinez, Steven L. “Tailored Warfighter Support,” *AFLMA: 2001 in Review*, 148-159. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Masciulli, Jason L. “Combat Readiness CD-ROM: One-Stop Shopping,” *AFLMA: 2001 in Review*, 194-197. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Miller, Joe. “Three Degrees of Change: A Conceptual Tool for Leaders,” [website on-line]; available from http://www.amsc.belvoir.army.mil/art_98-2miller3rd.htm; Internet; accessed 3 November 2002.
- Neuber, Jeffrey W. “Looking to the Future: Logistics Plans 2001,” *AFLMA: 2001 in Review*, 202-206. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Pagonis, William G. and Jeffrey L. Cruikshank. *Moving Mountains: Lessons in Leadership and Logistics from the Gulf War*. Boston, MA: Harvard Business School Press, 1992.

- Quotes for the Air Force Logistician*. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001.
- Rolfesen, Bruce. "Shaking Things Up: Chief of Staff Hopes Reorganization Boosts Capability, Fosters More Skilled Mission Support Groups," *Air Force Times*, 8 July 2002, 16
- Scott, Beth F., James C. Rainey, and Andrew W. Hunt, eds. *The Logistics of War: A Historical Perspective*. Maxwell AFB, AL: Air Force Logistics Management Agency, 2000.
- Training and Doctrine Command Pamphlet 71-9: Requirements Determination*. Fort Monroe, VA: Headquarters United States Army Training and Doctrine Command, 1999.
- Wagner, Martin S. "Multifunctional Logistics Officer Corps: Should the Army Consolidate the Officer Corps of the Transportation, Quartermaster and Ordnance Corps into One Multifunctional Branch?" MMAS monograph. School of Advanced Military Studies, 2000.
- Winkler, John W. "Transportation Data Systems: The Need for More Efficiency," *AFLMA: 2001 in Review*, 201. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2002.
- Van Creveld, Martin. *Supplying War: Logistics from Wallenstein to Patton*. New York, NY: Cambridge University Press, 1977.
- Zettler, Michael E. "Air Force Logisticians: Generalists or Specialists?" Individual Studies Program Report. Washington, D.C.: Industrial College of the Armed Forces, 1986.
- _____. "Changing Air Force Logistics: Chief's Logistics Review," *Air Force Journal of Logistics*, 25, no. 2. Maxwell AFB, Gunter Annex, AL: Air Force Logistics Management Agency, 2001.
- _____. "Chief's Logistics Review: Combat Wing Organization," *The Exceptional Release*, n.s. 86 (Summer 2002). Arlington, VA: Logistics Officer Association, 2002.